

RECORD OF DECISION
Final Environmental Impact Statement
**Establishment and Operation of an Intelligence, Surveillance,
Reconnaissance, and Strike Capability**
Andersen Air Force Base, Guam

This document records the decision of the United States Air Force (Air Force) with regard to establishment and operation of an Intelligence, Surveillance, Reconnaissance, and Strike (ISR/Strike) capability at Andersen Air Force Base (AFB), Guam. In making this decision, the information, analyses, and public comments contained in the *Final Environmental Impact Statement (EIS) for Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability at Andersen Air Force Base, Guam* were considered, along with other relevant supporting materials composing the project file.

This Record of Decision (ROD) is prepared in accordance with the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA), specifically Title 40 Code of Federal Regulations (CFR) Part 1505.2, *Record of Decision in Cases Requiring Environmental Impact Statements* (40 CFR §1505.2). Specifically, this ROD:

- States the Air Force's decision (see page 10);
- Identifies all alternatives considered by the Air Force in reaching the decision (see page 4) and specifies the environmentally preferable alternative (see page 5);
- Identifies and discusses relevant factors (*e.g.*, statutory mission, national security policy, operational, environmental, economic, and technical) that were considered in making the decision among the alternatives, and states how those considerations entered into this decision (throughout the ROD); and
- States the mitigation adopted, determines whether all practicable means to avoid or minimize environmental harm from the selected alternative have been adopted, and summarizes the applicable monitoring and enforcement program adopted for the applicable mitigation (see page 6).

BACKGROUND

The 2001 Quadrennial Defense Review (QDR) and related national strategic plans noted that the Asian region has become increasingly important to regional and United States security. The 2001 QDR directed the Air Force to expand basing in the Pacific region with a regionally tailored, multifaceted force able to respond quickly when needed. In response, the Air Force proposes to locate the U.S. Pacific Command's ISR/Strike capability, aerial refueling aircraft, and support personnel in the western Pacific to Andersen AFB, Guam (the Base). The objective of the ISR/Strike capability will be to achieve pre-engagement battle space awareness, locate and identify critical adversary movement, achieve assured success through air dominance, and deliver decisive effects via persistent and precise application of air and space power. (The proposal to establish an ISR/Strike capability was developed prior to the

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14. ABSTRACT

The 2001 Quadrennial Defense Review (QDR) noted that the Asian region has become increasingly important to regional and United States security and directed the Air Force to expand basing in the western Pacific to increase its ability to respond quickly to defeat an adversary's military or political objectives. In response, the Air Force plans to locate the U.S. Pacific Command's ISR/Strike capability, in the western Pacific. Andersen AFB was identified as the installation best suited to host the ISR/Strike capability in a process driven by the 2001 QDR and a consideration of six installations in the Pacific Air Forces' area of responsibility. Establishment of the ISR/Strike capability would begin in fiscal year (FY)07 and would be completed about 16 years later. Alternative A would establish the ISR/Strike capability by basing as many as 12 KC-135 aerial refueling aircraft and four Global Hawk RQ-4 unmanned aerial vehicles (Global Hawk) and support personnel at Andersen AFB. As many as 48 fighter aircraft (F-22 and F-15E) and six bomber aircraft (B-1, B-2, and B-52) and personnel would be rotated from bases in the 50 states. The Base population would increase by as many as 3,000 personnel when combining the additional military, Air Force civilian, contractor, and dependent personnel. Facility construction, addition, and alteration projects, including 190 family housing units and associated family housing support facilities, would occur to support the establishment and operation of the ISR/Strike capability. Alternative B would establish the ISR/Strike capability by rotating as many as 48 fighter aircraft (F-22 and F-15E), 12 KC-135s, and six bombers (B-1, B-2, and B-52) and support personnel to Andersen AFB from bases in the 50 states, and basing four Global Hawks and associated support personnel. The Base population would increase by as many as 1,850 personnel. The type and number of facility construction, addition, and alteration projects associated with Alternative B would be similar to those for Alternative A. The 190 family housing units and associated family housing support facilities would not be constructed. Under the No Action Alternative, the ISR/Strike capability would not be established. Environmental resources considered in the impact analysis were: noise; land use; air quality infrastructure and utilities; biological resources; cultural resources; earth resources; groundwater resources; hazardous materials and waste; socioeconomic resources; airfield operations; and environmental justice. Compliance with coastal zone consistency is addressed under special regulatory guidelines and environmental review procedures.

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2005 Base Realignment and Closure Commission process, and the ISR/Strike capability is not part of the decisions from that process.)

A viable location for the ISR/Strike capability for the Pacific region, must:

- Be on U.S. territory to allow implementation of procedures for security protection of forces;
- Allow all elements of the ISR/Strike capability to be on one installation;
- Allow deployed aircraft to reach areas of conflict in East Asia and return to the same base in the required response time;
- Allow bomber aircraft to reach areas of conflict without additional airlift assets;
- Allow Global Hawk unmanned aerial vehicle aircraft, which are not capable of being refueled in flight, to return to the installation at which they are based;
- Have adequate existing airfield infrastructure (e.g., runways, aircraft parking, and associated airfield support systems) that allows for additional aircraft operations without interfering with existing operations; and
- Have adequate base operating support or weapon storage areas that would allow for 30-day continuous airfield operations without constant logistical re-supply from air or sea.

Andersen AFB was identified as the installation best suited to host the ISR/Strike capability (and thus to be carried forward for detailed analysis in the EIS) in a process initiated by the 2001 QDR that considered the following six installations in the Pacific Air Forces' area of responsibility: Iwo Jima, Japan; Saipan, Commonwealth of Northern Mariana Islands; Diego Garcia; Wake Island; Hawaii; and Guam.

The Air Force, when balancing the essential considerations of national policy, the selection standards and other matters, chose Andersen AFB, and did not carry the other six installations considered forward for detailed analysis in the EIS, for the following reasons:

The other six installations did not meet one or more of the selection standards noted above and in the EIS. Several are on foreign soil, for example. In addition to not meeting the specific selection standards with regard to placement on U.S. territory, with regard to locations considered but not carried forward which are not on U.S. territory, obtaining permission which may be required to launch offensive strikes from a foreign country could have significant adverse impacts to U.S. national security.

As a matter of security, support infrastructure, the military principle of economy of force, and operating cost, and consistent with Air Force practice to typically locate ISR assets at main operating bases throughout the world, Andersen AFB provides a main operating base which fully meets the purpose and need of the proposed action. Neither Hawaii nor Wake Island, for example, can provide the military principle of economy of force, a reasonable operating cost, or the necessary unrestricted use of either ISR assets or strike aircraft within a reasonable distance from their intended wartime operating locations. Although bases on Hawaii have weapons storage areas, the ability to support increased capability such as that associated with ISR/Strike is limited due to the

distance between weapons storage loading and unloading. Although Hawaii has adequate airfield infrastructure, commercial aircraft operations will interfere with ISR/Strike operations.

Splitting the ISR/Strike assets across two or more beddown locations (e.g., Guam and Saipan) will increase the footprint of the support facilities. By placing some assets on Andersen AFB and other assets at another location, the combined footprint of areas required to support the ISR/Strike mission will be exponentially increased. For example, construction of duplicate facilities (e.g., security protection, aircraft maintenance, etc.) is required because facilities at a single location are shared by more than one element of the ISR/Strike capability, thereby increasing the overall cost. Also, the element of surprise is reduced if ISR/Strike aircraft are launched from two locations.

A new, emerging war on terror paradigm recognizes Guam's geographic importance as the U.S. territory nearest to global hotspots of U.S. concern in Asia and the Middle East. Andersen AFB is ideally situated in the Western Pacific to provide easy reach to key regional strategic destinations. From Guam, combat aircraft are within easy striking range of the region's likely potential hot spots, yet far enough from an adversary's missile-launch sites to limit the likely effects of such strikes.

When discussing U.S. operations in the Pacific region, the concept of "tyranny of distance" is often used to describe the limits of military involvement in the region. "Tyranny of distance" is a military term describing the long distances that forces must travel across the Pacific from the U.S. to reach operational targets. Locating the forces nearer to the targets increases the element of surprise and reduces operational constraints (e.g., the number of aerial refuelings and length of duty for the aircrew).

PUBLIC INVOLVEMENT

The public involvement process and Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) and agency consultation accomplished by the Air Force for the EIS is discussed in the Final EIS (Subchapter 1.2.3 and Appendices A and B). The major elements of public involvement and IICEP include:

- Issuance of a Notice of Intent to prepare an EIS in the *Federal Register* (Vol. 70, No. 95, Page 28517) on May 18, 2005;
- Performing public and agency scoping from May 18, 2005 to June 30, 2005;
- Conducting a stakeholder's meeting on November 9, 2005 in Hagatna, Guam;
- Issuance of a Notice of Availability of the Draft EIS and initiating the 45-day public comment period for the Draft EIS on May 12, 2006 in the *Federal Register* (Vol. 71, No. 92, Page 27715);
- Conducting a public hearing on June 1, 2006 in Hagatna, Guam; and
- Issuance of notice of the 30-day Final EIS post-filing waiting period in the *Federal Register* (Vol. 71, No. 226, Page 67863).

The Air Force considered relevant issues raised during the agency and public review period for the Draft EIS. The Air Force received 13 written comment letters from government

agencies, organizations, and interested individuals on the Draft EIS during the 45-day public comment period. Table 1.2-3 of the Final EIS summarizes comments received from the public hearing and review of the Draft EIS. Furthermore, written comment letters and oral testimony are summarized in Appendix B of the Final EIS, which includes responses to relevant issues.

Comments received during the 45-day public comment period were considered in preparation of the Final EIS, which was issued on November 24, 2006 (*Federal Register*, Vol. 71, No. 226, Page 67863). The Final EIS includes identification of mitigation measures to reduce environmental consequences, public and agency comments, and responses to comments.

AGENCY CONSULTATION AND COORDINATION

The Air Force consulted and coordinated with federal and Government of Guam (GovGuam) agencies regarding: (1) Section 7 consultation under the *Endangered Species Act* (ESA) with the U.S. Fish and Wildlife Service (USFWS); (2) Section 106 consultation under the *National Historic Preservation Act* of 1966 with the Guam State Historic Preservation Officer (GSHPO); and (3) *Coastal Zone Management Act* consultation with the GovGuam, Bureau of Statistics and Plans. These consultations are summarized and discussed in Tables ES-1 and ES-2, Subchapter 1.2.5, Appendices D and E, and other applicable sections of the Final EIS.

ALTERNATIVES ANALYZED

After considering a total of six location alternatives and a number of alternatives for the number of aircraft and status of personnel for ISR/Strike, two alternatives were identified for detailed analysis. In addition, the Air Force also analyzed the No Action Alternative.

Alternative A: Establish the ISR/Strike Capability by Permanently Basing Tankers, Unmanned Aerial Vehicles, and Personnel at Andersen AFB and Rotating Fighter and Bomber Aircraft and Personnel

As many as 12 KC-135 tanker aircraft and four Global Hawk unmanned aerial vehicles and personnel will be permanently based at the main area of Andersen AFB, and as many as 48 fighter (F-22 and F-15E) and six bomber (B-1, B-2, and B-52) aircraft and personnel will be rotated from bases in the 50 states. Alternative A will establish an ISR/Strike operational capability in four phases over a 16-year period. Construction will begin in fiscal year 2007 (FY07) and occur over an approximate 16-year period. Initiation of construction activities prior to the initial operational capability established with arrival of the first aircraft in Phase 0 is necessary to ensure the required facilities are in place to support aircraft operations. Construction will be subject to Congressional funding. Due to possible funding shifts, construction could be delayed and extended. The operational capability phases and the approximate years associated with the phases are:

- FY07-10, Phase 0
- FY11-15, Phase 1;
- FY16-18, Phase 2; and
- FY19 and beyond, Phase 3.

Eighty percent of fighter operations will be accomplished by F-22 aircraft, and 20 percent will be accomplished by F-15Es. Ten percent of bomber operations will be accomplished by B-2 aircraft, and 45 percent will be accomplished by B-1s and B-52s, respectively. Construction activities will begin in FY07 and the final operational phase will occur in FY19, after which full ISR/Strike capability recurring aircraft operations will occur. When fully established, Alternative A will increase Base population by approximately 3,000 personnel when combining the additional military, Air Force civilian, contractor, and dependent personnel. Facility construction, addition, and alteration projects will be accomplished to support ISR/Strike establishment and operation activities. The alternative also includes conservation measures to mitigate the effects of construction and operation activities on biological resources. Approximately 190 family housing units and associated family housing support facilities will be constructed. Average busy day airfield operations will increase from approximately 235 operations to 397 operations.

Alternative B: Establish the ISR/Strike Capability by Rotating Fighter, Tanker, and Bomber Aircraft and Personnel to Andersen AFB and Permanently Basing Unmanned Aerial Vehicles and Personnel

Alternative B is the same as Alternative A except that the following elements of Alternative A would not occur under Alternative B:

- The 12 KC-135 tankers and personnel would be rotational instead of permanently based;
- The Base population would increase by as many as 1,850 personnel as opposed to the 3,000 under Alternative A;
- The 190 family housing units and associated family housing support facilities would not be constructed; and
- Average busy day airfield operations would increase from approximately 235 operations to as many as 381 operations.

No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established. Andersen AFB would continue as a location from which as many as six bomber and tanker aircraft accomplish operations on a rotational basis. The Base would also continue to provide refueling and crew rest support for transient military and civil transient aircraft. Construction projects would be those typically accomplished for individually programmed facility actions and operations and maintenance activities.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

Alternative B is the environmentally preferable alternative. Alternative B would result in less impact on land use, infrastructure and utilities, groundwater resources, earth resources, and socioeconomic resources than Alternative A because Alternative B would add fewer people and accomplish less construction than Alternative A.

However, both Alternative B and Alternative A include conservation measures to enhance the recovery of native habitats and federally listed endangered species. The conservation measures (*i.e.*, mitigation, see Mitigation Measures below) would not be implemented under the No Action Alternative. Thus, under the No Action Alternative, habitat important to federally listed species would not improve, which would lessen the likelihood that the listed species (*i.e.*, Mariana crow and Mariana fruit bat) would recover.

One of the conservation measures under Alternative A and Alternative B will establish 200 hectares (494 acres) of primary and intact secondary limestone forest to improve forest and habitat quality. The 200-hectare (494-acre) area, which would not be established and would continue to degrade under the No Action Alternative, would offset the loss of 74 hectares (183 acres) subject to clearing for facility construction under either Alternative A or Alternative B, and would contribute to the recovery of listed species. In addition, the conservation measures address issues associated with exotic predator interdiction and control. Many of the ISR/Strike conservation measures correspond directly to activities identified as critical recovery actions in the USFWS recovery plans for listed species. The benefit of the conservation measures to the recovery actions would not occur under the No Action Alternative. Furthermore, the ISR/Strike conservation measures would effectively manage areas of higher quality habitat for listed species, areas that would not occur under the No Action Alternative. As a result, the species would have better quality habitat, effectively enhanced by the conservation measures associated with Alternative A and Alternative B.

MITIGATION MEASURES

Mitigation, as defined by the CEQ (40 CFR Part 1508.20), includes the following concepts:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by providing substitute resources or environments.

Conservation measures, as defined in the *Endangered Species Consultation Handbook* for Section 7 consultation, are actions to benefit or promote recovery of listed species included by the federal agency as an integral part of the proposed action. These actions are taken by the federal agency and serve to minimize or compensate for project effects on the species under review.

“Compensating” and “minimizing” are common to both the Section 7 consultation process and the CEQ guidance for accomplishing environmental impact analysis under NEPA. For this reason, conservation measures and mitigation are used interchangeably in this ROD for biological resources. Conservation measures (*i.e.*, mitigation) were identified during the scoping and Section 7 consultation processes, and are included in Alternative A and Alternative B. Implementation of the conservation measures will minimize and compensate

(i.e., mitigate) for potential effects of the ISR/Strike project on the species under review. The Air Force has agreed to non-discretionary terms and conditions associated with the Incidental Take Statement from the Biological Opinion.

Numerous mitigations are incorporated into construction, implementation, and management practices specific to the ISR/Strike.

- New facilities and military family housing units will be constructed to meet the Air Force policy to implement, where feasible, noise level reduction measures in on-Base residential and public use buildings. The high school that will be constructed on-Base, and existing on-base schools when modernized will meet the American National Standards Institute, Inc. classroom acoustics standard.
- Numerous construction projects will be accomplished to establish the ISR/Strike capability. Construction contractors will prepare Environmental Protection Plans and implement the mitigations identified in the Plans during construction and demolition activities. Mitigations to minimize the potential for storm water, groundwater, and earth resources impacts include activities such as installation of silt fences and absorbent booms down gradient of the construction site and installation of hay bales or other absorbent materials around storm drainage system inlets. Additionally, diversion ditches will be constructed to retard and divert runoff to protected drainage courses.
- All green waste will be segregated and collected for mulching, chipping, and composting or burned in small piles on site after obtaining a burning permit from the local fire department.
- Contracts issued for construction activities will require the contractor to recycle construction and demolition debris to the maximum extent possible.
- Work in a project area will be suspended, absent a written agreement to the contrary, should historic resources or archaeological resources be discovered during project activities, and the Andersen AFB Environmental Flight will consult the GSHPO and follow guidance in relevant laws, regulations, and the standard operating procedures outlined in the Base's Integrated Cultural Resources Management Plan.
- Aircraft operating at the Andersen AFB airfield will continue to follow existing procedures that restrict overflight of federally listed endangered Mariana crow and Mariana fruit bat territories.
- ISR/Strike fighters and bombers will continue to use the Farallon de Medinilla (FDM) Range and associated Northern Marianas Range Complex for live weapons training. Military training activities at the Range Complex were assessed under NEPA in an EIS entitled *Military Training in the Marianas Environmental Impact Statement* (Marianas Training EIS). Mitigation resulting from the Section 7 consultation process associated with preparation of the Marianas Training EIS included the Navy restricting the impact zone to the central interior portion and/or southern tip of the island and western cliff faces to the maximum extent possible. Additionally, the Navy agreed to prohibit the use of cluster bombs in training on FDM. As explained in Subchapter 1.2.2 of the ISR/Strike Final EIS, present and proposed use of FDM, to include the combined Navy and Marine Corps and ISR/Strike aircraft operations, will not exceed previously

determined thresholds and will continue to follow previously identified mitigation measures.

The Air Force further commits to the following conservation measures/mitigation for biological resources (see Subchapter 2.2.1.2 of the Final EIS):

- Adjustment of the Construction Footprint for the Aircraft Staging Area (to include the Perimeter Road) and Military Family Housing to Minimize and Avoid Habitat Clearing;
- Budget for employment of a full-time Wildlife Management Specialist ;
- Ungulate Exclosure Fencing;
- Development of an Ungulate Control Plan and Facilitation of Research;
- Transplanting of *Tabernaemontana rotensis* Seedlings and Saplings;
- Outplanting of Trees Important to Mariana Fruit Bat and Mariana Crow;
- Vegetation Surveys Relevant to Recovery of Mariana Fruit Bat and Mariana Crow;
- Noise Study;
- Environmental Education and Awareness Information for incoming military personnel on identification, behavior, and habits of the BTS;
- Encouragement of Mariana Fruit Bat Pup Recruitment at Pati Point Colony;
- Brown Tree Snake Interdiction and Control; and
- Adaptive Management and Ground Track Modification.

Conservation measures are incorporated into Alternative A and Alternative B, and implementation of the measures is an essential element of the USFWS's conclusion that the ISR/Strike project is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Micronesian kingfisher, Guam rail, or other off-site species listed under the ESA. These conservation measures will be carried out to support and enhance the Air Force's cooperative commitments to local and federal wildlife management agencies and non-governmental organizations, and are designed to reduce any impacts to threatened or endangered species. These habitat enhancement and protection actions are designed to assist in the protection and recovery of, specifically, the Mariana fruit bat, Mariana crow, Micronesian kingfisher, and the Guam rail.

The conservation measures, as components of Alternative A, correspond to recovery actions outlined in various USFWS recovery plans. Overall goals of the conservation measures contribute to important habitat and species management objectives on Guam, including management and removal of the brown tree snake (BTS), habitat restoration and protection, feral ungulate impact reduction, and research. Implementation of the conservation measures will be adjusted at the time of execution to utilize best management practices and input of cooperating agencies.

The Air Force will beddown and operate two squadrons and three training programs at the Northwest Field area of Andersen AFB concurrent with the establishment and operation of the ISR/Strike capability. One of the conservation measures included in the Northwest Field

action will establish a new habitat management unit (HMU) at Andersen AFB. Comments from the U.S. Environmental Protection Agency (USEPA) review of the Draft EIS requested that details concerning the HMU be included in this ROD.

Area 50 is an opportunistic experimental HMU south of the Northwest Field runway. This area lies within the overlay refuge and was fenced in 1991 to exclude ungulates. In 1998, extensive measures were undertaken to remove BTSs from Area 50. The BTS control efforts reduced the population of BTSs enough to allow an experimental attempt to release captive-bred Guam rails into Area 50. Area 50 has also been studied extensively to directly compare forest growth, regeneration, and other ecological characteristics within secondary growth forests found in adjacent areas. The Guam Department of Agriculture's Division of Aquatic and Wildlife Resources (DAWR) is the primary entity for these ecological studies. Area 50 will continue to be used for biological resources studies.

A new HMU (60 hectares/148 acres) will be established for biological resources studies within the overlay refuge, south of Northwest Field and west of Munitions Storage Area 1. The new HMU will be fenced to prevent incursion of deer, feral pigs, and BTSs. The fence will also be expected to repel feral cats. Management and operation of the new HMU will be established in a partnering relationship among Andersen AFB, the USFWS, and the DAWR. The Area 50 Restoration Plan, which was developed by DAWR with assistance from the Air Force, United States Geological Service, United States Department of Agriculture, and USFWS, will provide guidance for management of the new HMU.

The 36th Wing, the host unit at Andersen AFB, will be responsible for initiating the funding process, implementing, and monitoring the conservation measures/mitigation measures [32 CFR Part 989.22(a)] through the establishment of a mitigation monitoring plan and adaptive management program.

FUTURE ACTIONS

As discussed in the Final EIS, the Air Force recognizes that future actions are planned for Guam; however, the Air Force cannot reasonably speculate on preliminary proposals that are still under development and that are not presently capable of meaningful analysis. After completion of the ISR/Strike EIS, comments were provided by USEPA, Region IX. These comments referred to a *Guam Integrated Military Development Plan* (GIMDP), released in July 2006, after publication of the ISR/Strike Draft EIS. The USEPA comments suggested that other Department of Defense (DoD) moves to Guam have been the subject of substantial long-range planning and that the Air Force should address related issues as reasonable foreseeable actions. The Air Force understands that the GIMDP is not a final proposal for action; it is a preliminary plan, with substantial additional planning required that could take upwards of two years to complete. The Air Force considers the details of this ongoing planning to be currently undefined, speculative, and not conducive to an informative environmental analysis.

In its response to comments received during the Draft EIS public comment period, the Air Force responded to a similar comment, in part, by stating, "The Air Force declined to wait two years to modify the analysis in the EIS as suggested by the commenter because Subchapter 1.2.1 already describes the unavailability of the information needed to assess the cumulative impacts of the other action identified in the comment."

The Air Force does not consider the unavailable information regarding potential relocation of Marines to Guam to be relevant to any significant environmental impacts or essential to any reasoned choice among alternatives for the ISR/Strike beddown and operations. Further, even if such information were relevant to significant adverse impacts or essential to a choice among alternatives, the Air Force considers the cost of a two-year delay to obtain that information for this EIS to be exorbitant and inconsistent with the Air Force's responsibilities to the DoD mission.


DECISION

After consideration of the matters discussed in this ROD, the Final EIS, inputs from the public, regulatory agencies, and other relevant factors, the Air Force has decided to implement Alternative A (base tanker and Global Hawk aircraft and personnel at Andersen AFB and deploy, on a rotational basis, fighter and bomber aircraft and personnel from home bases in the 50 states).

The decision takes into account the direct, indirect, and cumulative impacts from the alternative. Alternative A is the preferred alternative; it includes all practicable means to avoid, minimize, or mitigate environmental harm. Although conservation measures/mitigations are included as part of this decision, identified conservation measures/mitigations could be reexamined and reevaluated in any future environmental impacts analyses for potential future Federal actions on Guam.

The Air Force also considered relevant economic and technical factors, including its statutory mission. Alternative A meets the purpose and need, based on selection standards, to establish and operate an ISR/Strike capability in the Pacific Region. Consideration of the national strategic policy entered into the Air Force's decision to select Alternative A. Alternative A is consistent with the Office of the Secretary of Defense approved recommendation to base permanent tankers on Guam to support the ISR/Strike capability. In addition, the constant flow of expeditionary air power through Andersen AFB combined with the need for a rapid stand-up of air refueling bridges, drives the requirement for a permanent-based tanker presence at Andersen AFB.

Approved by:



Signature

11/12/07

Date

FRED W. KUHN
Deputy Assistant of the Air Force
(Installations)

**Final Environmental Impact Statement
Establishment and Operation of an
Intelligence, Surveillance,
Reconnaissance, and Strike Capability
Andersen Air Force Base, Guam
Volume I**



**Department of the Air Force
Pacific Air Forces
Hickam Air Force Base, Hawaii
November
2006**



**FINAL
ENVIRONMENTAL IMPACT STATEMENT
ESTABLISHMENT AND OPERATION OF AN INTELLIGENCE,
SURVEILLANCE, RECONNAISSANCE, AND STRIKE CAPABILITY
ANDERSEN AIR FORCE BASE, GUAM**

VOLUME 1

**DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES
HICKAM AIR FORCE BASE, HAWAII**

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**FINAL ENVIRONMENTAL IMPACT STATEMENT
ESTABLISHMENT AND OPERATION OF AN INTELLIGENCE, SURVEILLANCE,
RECONNAISSANCE, AND STRIKE CAPABILITY
AT ANDERSEN AIR FORCE BASE, GUAM**

Responsible Agency: Department of the Air Force, Headquarters, Pacific Air Forces, Hickam AFB, Hawaii.

Cooperating Agency: Department of the Navy.

Proposed Action: Establish and Operate an Intelligence, Surveillance, Reconnaissance, and Strike (ISR/Strike) capability at Andersen AFB (AFB), Guam.

Written comments and inquiries regarding this document should be directed to: Mr. Jonathan Wald, Chief, Conservation Resources, Unit 14007, APO, AP 96543-4007.

Abstract: The 2001 Quadrennial Defense Review (QDR) noted that the Asian region has become increasingly important to regional and United States security and directed the Air Force to expand basing in the western Pacific to increase its ability to respond quickly to defeat an adversary's military or political objectives. In response, the Air Force plans to locate the U.S. Pacific Command's ISR/Strike capability, in the western Pacific. Andersen AFB was identified as the installation best suited to host the ISR/Strike capability in a process driven by the 2001 QDR and a consideration of six installations in the Pacific Air Forces' area of responsibility.

Establishment of the ISR/Strike capability would begin in fiscal year (FY)07 and would be completed about 16 years later. Alternative A would establish the ISR/Strike capability by basing as many as 12 KC-135 aerial refueling aircraft and four Global Hawk RQ-4 unmanned aerial vehicles (Global Hawk) and support personnel at Andersen AFB. As many as 48 fighter aircraft (F-22 and F-15E) and six bomber aircraft (B-1, B-2, and B-52) and personnel would be rotated from bases in the 50 states. The Base population would increase by as many as 3,000 personnel when combining the additional military, Air Force civilian, contractor, and dependent personnel. Facility construction, addition, and alteration projects, including 190 family housing units and associated family housing support facilities, would occur to support the establishment and operation of the ISR/Strike capability.

Alternative B would establish the ISR/Strike capability by rotating as many as 48 fighter aircraft (F-22 and F-15E), 12 KC-135s, and six bombers (B-1, B-2, and B-52) and support personnel to Andersen AFB from bases in the 50 states, and basing four Global Hawks and associated support personnel. The Base population would increase by as many as 1,850 personnel. The type and number of facility construction, addition, and alteration projects associated with Alternative B would be similar to those for Alternative A. The 190 family housing units and associated family housing support facilities would not be constructed.

Under the No Action Alternative, the ISR/Strike capability would not be established. Environmental resources considered in the impact analysis were: noise; land use; air quality; infrastructure and utilities; biological resources; cultural resources; earth resources; groundwater resources; hazardous materials and waste; socioeconomic resources; airfield operations; and environmental justice. Compliance with coastal zone consistency is addressed under special regulatory guidelines and environmental review procedures.

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EXECUTIVE SUMMARY

ES 1 Introduction

The proposed action would establish an Intelligence, Surveillance, Reconnaissance, and Strike (ISR/Strike) operational capability in four phases over an approximate 16-year period in the western Pacific, beginning in fiscal year (FY)07. The ISR/Strike capability would consist of fighter, aerial refueling, bomber, unmanned aerial vehicle aircraft, and support personnel.

ES 2 Purpose of and Need for Action

The 2001 Quadrennial Defense Review (QDR) directed the Air Force to expand basing in the Pacific region with a regionally tailored, multifaceted force able to respond quickly when needed. In response, the Air Force proposes to locate the U.S. Pacific Command's ISR/Strike capability, aerial refueling aircraft, and support personnel in the western Pacific on Andersen Air Force Base (AFB) (the Base) on the Island of Guam. The ISR/Strike capability would allow more timely and effective response. The objective of the ISR/Strike capability would be to achieve pre-engagement battle space awareness, locate and identify critical adversary movement, achieve assured success through air dominance, and deliver decisive effects via persistent and precise application of air and space power. (The proposal to establish an ISR/Strike capability was developed prior to the 2005 Base Realignment and Closure Commission [BRAC] process, and the ISR/Strike capability is not part of the decisions from that process.) Andersen AFB was identified as the installation best suited to host the ISR/Strike capability in a process driven by the 2001 QDR and a consideration of six installations in the Pacific Air Forces' area of responsibility.

ES 3 Scope of the Environmental Review

The National Environmental Policy Act (NEPA) of 1969, as amended, requires federal agencies to consider environmental consequences in the decision-making process. The Air Force Environmental Impact Analysis Process (EIAP) is accomplished through adherence to the procedures set forth in Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] Part 1500), which were issued to implement NEPA, and 32 CFR, Part 989 (*Air Force Environmental Impact Analysis Process*). These federal regulations establish both the administrative process and substantive scope of the environmental impact evaluation designed to ensure that deciding authorities have a proper understanding of the potential environmental consequences of a contemplated course of action.

The Air Force is preparing this environmental impact statement (EIS) to determine the potential environmental consequences associated with establishment of the ISR/Strike capability at Andersen AFB. An EIS entitled *Military Training in the Marianas* (Marianas Training EIS) (USPACOM 1999) is incorporated by reference (consistent with 40 CFR §1502.21) and discussed, as required, in various sections of this EIS. The capability of Farallon de Medinilla (FDM) to support Air Force proposed operations and associated impacts post-ISR/Strike beddown would be ripe for evaluation in the upcoming Mariana Islands Range Complex EIS, which is expected to be completed in FY09 during operational phase Phase 0 (see ES 5). Analysis of the proposed ISR/Strike training operations at FDM is not possible at this time because the training requirements have not been finalized.

The establishment and operation of an ISR/Strike capability at Andersen AFB would take place in phases over a period of time spanning as many as 16 years. Because of the time span involved as well as other factors, overall only some aspects of the proposed action are currently ripe for decision because of incomplete information. Thus, the Air Force is preparing this EIS to focus on those issues now ripe for decision, which include all elements of the ISR/Strike capability except for items such as aircrew training (see ES 3.2), wastewater treatment, and landfill space. As previously mentioned, analysis for the aircrew training should be completed in FY09 when the Navy completes the Mariana Islands Range Complex EIS. Analysis of wastewater treatment could be finalized after the wastewater treatment plant permitting process is completed by the Government of Guam (GovGuam). Landfill analysis may be completed after the current Andersen AFB landfill study is completed in FY07 and when the GovGuam finalizes its landfill project. Because the ISR/Strike capability is planned for a 16-year implementation period, it is possible that details associated with the proposed action assessed in this EIS could change. Additional details may become available during the implementation period, or plans could change due to factors unforeseen during preparation of this EIS. The Air Force will prepare later supplements or analyses “tiered” from this document at the appropriate times to address subsequent actions or new information.

This EIS identifies, describes, and evaluates potential environmental impacts that may result from the proposed establishment and operation of an ISR/Strike capability at Andersen AFB, the No Action Alternative, and possible cumulative impacts from other past, present, and reasonably foreseeable future actions planned for Andersen AFB.

ES 3.1 Past, Present, and Reasonably Foreseeable Future Actions

The Air Force is aware of the potential moves of non-Air Force Department of Defense (DoD) units to Guam and the 2005 BRAC-directed realignment that affect DoD units on Guam. The proponent(s) for these actions will address them in separate NEPA documents, as appropriate, when sufficient details for an environmental analysis become available. The non-Air Force DoD units will be able to address their projects in NEPA documents that cumulatively look at all DoD projects planned for Guam, to include Air Force projects. At this time, specific information on the non-Air Force DoD moves such as the number(s) of personnel, the location(s) of the basing actions, the number(s) and type(s) of facilities that would be constructed, the timing and financing of the projects, and the type and location of training activities associated with these proposals, has not been detailed. Thus, it is not possible to analyze the cumulative impacts of the ISR/Strike proposal with the aforementioned proposed non-Air Force future actions.

The Air Force contacted the two Navy installations on Guam and GovGuam for details concerning their upcoming actions that should be considered for cumulative impact purposes. No actions were identified by the two Navy installations (Cruz 2005b) or GovGuam. However, a Notice of Intent to prepare an EIS was published July 29, 2005 for the Navy’s Wharf Expansion project. This project, when added to other past, present, and reasonably foreseeable future actions, has no expected cumulative impact on this proposed action.

The 2005 BRAC-directed joint-basing operation at Andersen AFB determined that the Navy will be the lead DoD Service in command of military operations for all Services stationed on the Island of Guam, including military family housing. As a result, a joint Navy-Air Force Housing

Requirements and Market Analysis for almost the entire island is being accomplished and the results are not expected until early 2007. The joint analysis will determine military family housing requirements for the Air Force, Navy, and Marine Corps, and will take into account any mission change for the Navy, Air Force, and Marine Corps. The military family housing analysis will also consider whether the housing program is better managed by the DoD or under a privatization contractor. NEPA analysis will be accomplished for the military family housing initiative when sufficient information is available after the analysis is complete and the DoD management/privatized housing management decision is made. The Air Force currently estimates approximately 190 additional military family housing units would be necessary to support the ISR/Strike capability. Thus, construction and occupancy of an additional 190 military family housing units are assessed in this EIS.

ES 3.2 Aircrew Training

Bomber and fighter aircrews associated with ISR/Strike would have a requirement to accomplish weapons delivery training, and fighter aircrews would have a requirement for training such as air-to-air combat. Tanker and unmanned aerial vehicle (Global Hawk) aircrews do not have training events that require ranges or special use airspace. Takeoff and landing training for fighter, bomber, tanker, and Global Hawk aircrews associated with the proposed action in this EIS would be accomplished in the airspace allocated to the Andersen AFB air traffic control tower. The Air Force would use the Navy's Northern Marianas Range Complex consisting of the FDM Range and the associated special use airspace for air-to-ground weapons and air-to-air training. The 206-acre range is located on an uninhabited island about 150 miles north of Guam. The advantages of using the FDM range are its ability to support live weapons training and its remoteness, which insulates it from encroachments by sea and air traffic, both of which permit the conduct of high value tactical strike training. Military training activities at the Range Complex were evaluated under NEPA in the Marianas Training EIS.

The Marianas Training EIS assessed Air Force activity that included sorties for rotational bombers at Andersen AFB on which a total of 7,344 live and inert bombs would be delivered annually. Between 5 and 612 live and inert weapons could be dropped each month, with lower numbers being more typical. Air Force bomber aircraft may conduct high-, medium-, and low-altitude bombing runs dropping conventional 500-, 750-, and 2,000-pound bombs; precision-guided munitions, and mines (USPACOM 1999). Approximately 45 percent of the FDM range sorties by bomber aircraft drop inert bombs only. In the 1998 biological opinion (BO), the training tempo and ordnance delivery included Air Force bombers flying up to 160 days per year, with up to two range sorties per day (320 annual sorties). According to the 2003 Target and Range Information Management System (TRIMS) data, the 23 Air Force sorties comprise about 4 percent of the total 516 annual sorties at FDM.

The types of weapons that would be released from the aircraft and the methods of delivery associated with the Andersen AFB rotational ISR/Strike bombers would be identical to that assessed for bomber aircraft in the Marianas Training EIS. The Air Force does not expect ISR/Strike bomber training to exceed the bomber training threshold (*i.e.*, release of 7,344 live and inert bombs) assessed in the Marianas Training EIS.

The Marianas Training EIS also assessed air-to-surface gunnery by Navy and Marine Corps fighter/attack aircraft (*e.g.*, F/A-18) practicing routine interdiction, strike, and close air support

missions. These aircraft deliver bombs (mostly 500-pound bombs) from all altitudes and air-to-ground missiles to the southern end of the island. The Marianas Training EIS assessed an annual ordnance delivery of 4,940 weapons from Navy and Marine Corps aircraft to include about 80 missiles, 840 rockets, and 4,020 bombs (1,400 small [250 to 500 pounds], 1,240 large [1,000 to 2,000 pounds], and 1,380 inert bombs) (USPACOM 1999).

The ISR/Strike F-22 and F-15E aircraft would deploy munitions very similar to those delivered by Navy F/A-18s, which are assessed in the Marianas Training EIS. Additionally, the operating characteristics (*i.e.*, airspeed and methods of ordnance delivery) of all three aircraft are very similar. Thus, the F-22s and F-15Es could be interchanged with the F/A-18s when considering the types of activities that were assessed for fighters in the Marianas Training EIS. Navy records for FY03 indicate that about 1,563 weapons were dropped on FDM by Navy, Marine Corps, and Air Force fighter aircraft. When subtracting the 1,563 weapons that were dropped in FY03 from the 4,940 that were assessed in the Marianas Training EIS, 3,337 weapons could be dropped annually by other FDM users such as the ISR/Strike fighters provided the actual FY03 data are representative for a typical year. The combined number of weapons that would be dropped annually on FDM by all users (*i.e.*, Navy, Marine Corps, and Air Force) would not exceed the threshold of 4,940 bombs that was assessed in the Marianas Training EIS. Additionally, operations by ISR/Strike aircraft would comply with the previously mentioned mitigation restrictions associated with operations at FDM.

The Navy will be revising the Range Complex Master Plan for all ranges within the Mariana Islands under the Tactical Training Theater Assessment and Planning Program. The Navy will prepare the Mariana Islands Range Complex EIS in conjunction with the Master Plan process. The EIS is anticipated to be completed in July 2009, which coincides with Phase 0 of the ISR/Strike operational capability (see ES 5). The Navy would evaluate training by the Navy, Marine Corps, and Air Force for all the Mariana Islands military training areas, to include Air Force bomber and fighter training at the Navy-managed FDM range. The Navy will include ISR/Strike training as part of the proposed action in the Mariana Islands Range Complex EIS. The capability of FDM to support operations post-ISR Strike beddown would be ripe for evaluation in the Mariana Islands Range Complex EIS. Analysis of the proposed ISR/Strike training operations at FDM is not possible at this time because the training requirements have not been finalized. The Air Force sent a letter to the Navy requesting that the Air Force be a cooperating agency for preparation of the Mariana Islands Range Complex EIS. In this capacity, the Air Force will participate in the scoping process, develop information, and prepare analyses for which it has special expertise, and provide staff for interdisciplinary reviews.

ES 3.3 Interagency and Intergovernmental Coordination for Environmental Planning and Public Participation

Interagency and Intergovernmental Coordination for Environmental Planning

The Air Force notified federal and Government of Guam (GovGuam) agencies of the proposed action at the public scoping meeting conducted on June 9, 2005, and the Draft EIS was distributed to federal and GovGuam agencies for review on May 12, 2006. Seven agencies provided comments on the Draft EIS.

Public Participation

The Air Force published a notice of intent to prepare an EIS for the establishment of the ISR/Strike capability in the *Federal Register* on May 18, 2005. Newspaper ads announcing the public scoping meeting were published in the *Pacific Daily News* on May 21 and June 5, 6, and 8, 2005.

The Air Force published a notice that the Draft EIS was available for review in the *Federal Register* on May 12, 2006. Newspaper ads announcing the availability of the Draft EIS for review and the public hearing that was held on June 1, 2006 were published in the *Pacific Daily News* on May 12, 14, and 30, 2006. The electronic file of the Draft EIS was available on an internet web site, and copies of the Draft EIS were available to the public at the Nieves Flores Memorial Library, Hagatna, Guam.

A total of 39 persons attended the ISR/Strike Draft EIS Public Hearing, which was announced in the May 12, 14, and 30 newspaper advertisements. Three individuals provided oral comments, and two written comment sheets were received at the public hearing. Five organizations and six individuals provided comments at the public hearing and from review of the Draft EIS.

ES 4 Alternatives Formulation and Consideration

Andersen AFB was identified as the installation best suited to host the ISR/Strike capability in a process driven by the 2001 QDR (see ES 2) and a process that considered six potential locations in Pacific Air Forces' area of responsibility. By establishing the ISR/Strike capability at Andersen AFB, economy of force is preserved, costs are limited, and use of ISR and Strike assets is unrestricted for both peacetime and wartime. Subchapter 2.1 of this EIS contains a detailed description of the alternatives formulation and consideration process.

As a result of the location and status selection processes, two reasonable alternatives for Andersen AFB (Alternative A and Alternative B) with variations in the based and/or rotational status of aircraft and personnel were identified and are assessed in detail in this EIS.

To achieve the objective for the ISR/Strike capability mentioned in ES 2, Purpose of and Need for Action, the Air Force determined that the following four aircraft types and numbers of each aircraft type are needed for the ISR/Strike capability: 48 fighter (F-22 and F-15E); 12 tanker (KC-135); six bomber (B-1, B-2, and B-52); and four Global Hawk unmanned aerial vehicles.

The Air Force EIAP Instruction (32 CFR 989.8(d)) states: "...except in those rare instances where excused by law, the Air Force must always consider and assess the environmental impacts of the 'no action' alternative." Thus, the alternative of not establishing an ISR/Strike capability was also identified (*i.e.*, No Action Alternative) and is analyzed in detail in this EIS.

ES 5 Proposed Action

The ISR/Strike operational capability would be established at Andersen AFB in four operational phases, with the first phase beginning in FY07. The phases are the same for each alternative. Construction would begin in FY07 and occur over an approximate 16-year period. Initiation of construction activities prior to the initial operational capability established with arrival of the first aircraft in Phase 0 is necessary to ensure the required facilities are in place to

support aircraft operations. Due to possible funding shifts, construction could be delayed and extended. The operational capability phases and the approximate years associated with the phases are:

- FY07-10, Phase 0;
- FY11-15, Phase 1;
- FY16-18, Phase 2; and
- FY19 and beyond, Phase 3.

The number of fighter and tanker aircraft and associated personnel would increase throughout the 16-year period beginning with Phase 1. The number of bomber and Global Hawk aircraft and associated personnel would remain constant throughout the implementation. As many as 70 ISR/Strike aircraft would be at Andersen AFB after full establishment.

All ISR/Strike activities at Andersen AFB would occur on the main base of the installation. Facility construction, addition, and alteration projects would occur to support ISR/Strike operational activities.

ES 5.1 Alternative A

Alternative A would base as many as 12 KC-135 tankers and four Global Hawks and personnel at Andersen AFB and rotate as many as 48 fighters (F-22 and F-15E) and six bombers (B-1, B-2, and B-52) and personnel from bases in the 50 states. Eighty percent of fighter operations would be accomplished by F-22 aircraft, and 20 percent would be accomplished by F-15Es. The percents of bomber operations would be: 10 percent B-2; 45 percent B-1; and 45 percent B-52. Construction activities would begin in FY07 and the final operational phase would occur in FY19, after which full ISR/Strike capability recurring aircraft operations would occur. When fully established, the ISR/Strike capability would increase Base population by as many as 3,000 personnel when combining the additional military, Air Force civilian, contractor, and dependent personnel. Facility construction, addition, and alteration projects would occur to support ISR/Strike establishment and operation activities. Alternative A also includes conservation measures to minimize and compensate for the effects of construction and operation activities on biological resources. Approximately 190 family housing units and associated family housing support facilities would be constructed. Average busy day airfield operations would increase from approximately 235 operations to as many as 397 operations.

ES 5.2 Alternative B

Alternative B is the same as Alternative A except that the following elements of Alternative A would not occur under Alternative B:

- The 12 KC-135 tankers and personnel would be rotational instead of based;
- The Base population would increase by as many as 1,850 personnel as opposed to the 3,000 under Alternative A;
- The 190 family housing units and associated family housing support facilities would not be constructed; and
- Average busy day airfield operations would increase from approximately 235 operations to as many as 381 operations.

ES 6 No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established. Andersen AFB would continue as a location from which as many as six bomber aircraft accomplish operations on a rotational basis. The Base would also continue to provide refueling, aircraft maintenance, and air cargo handling for transient military and civil transient aircraft. Construction projects would be those typically accomplished for individually programmed facility actions and operations and maintenance activities.

ES 7 Comparison of Environmental Effects of all Alternatives

Table ES-1 summarizes environmental impacts from Alternative A, Alternative B, and the No Action Alternative. As mentioned in ES 4, the Air Force determined that 48 fighters, 12 tankers, six bombers, and four Global Hawks would be necessary to meet the objective for the action. These numbers of aircraft represent the capability needed to meet the extreme condition to which the Air Force might be required to respond. There could be times when the numbers of fighters, tankers, and bombers could be less than 48, 12, and six aircraft, respectively. However, the greatest potential for impact to the environmental resources evaluated in this EIS would occur from the operation of 48 fighter, 12 tanker, six bomber, and four Global Hawk aircraft. The potential impacts associated with operation of reduced numbers of aircraft would be less than that from operation of the number of aircraft needed to meet the objective. Therefore, this EIS assesses the potential impacts from the operation of as many as 48 fighters, 12 tankers, six bombers, and four Global Hawks, and the personnel associated with these numbers of aircraft, after full ISR/Strike operational capability is established at Andersen AFB.

ES 8 Identification of the Preferred Alternative

The preferred alternative is Alternative A.

ES 9 Cumulative Actions and Impacts

The NEPA implementing regulations require analysis of impacts of not only the proposed action and alternatives (including a “No Action” Alternative), but also consideration of cumulative actions and cumulative impacts of Alternatives A and B with all past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. ES 3.1 describes additional discussion and consideration of other past, present, and reasonably foreseeable future actions.

This EIS considers the following Air Force-identified other actions and analyzes cumulative impacts in detail for the following actions:

- Facility construction projects identified through the routine base planning and development process, some of which are in progress (*e.g.*, water system upgrade) or would be initiated (*e.g.*, munitions storage igloo construction in FY06) before initiation of the ISR/Strike capability;
- Beginning in FY06, relocation of an Air Force Rapid Engineer Deployable Heavy Operational Repair Squadron Engineer, a Combat Communications squadron, and the Pacific Air Forces Silver Flag, Commando Warrior, and Combat Communications training programs to the Northwest Field area of Andersen AFB;

- Beginning in FY06, relocation of a Transportable Airlift Control Element unit and a Logistics Unit to Andersen AFB; and
- A Base population increase of 1,248 personnel as a result of the preceding other actions.

Table ES-2 summarizes the cumulative impacts.

Table ES-1 Summary of Environmental Impacts for Establishment of the ISR/Strike Capability

Noise
<p>Alternative A</p> <ul style="list-style-type: none"> • 2,566 persons exposed to day-night average sound level (DNL) 65 decibels (dBA) and greater equate to about 6 percent of the persons who live within a 5-mile radius of the airfield. • The nearby on-Base and an off-Base schools would continue to be exposed to noise from aircraft operations. • The on-Base high school would be constructed to meet noise level reduction standards. • Noise during an aircraft overflight could cause a decrease in speech intelligibility or cause the individuals to move closer together to be heard. • Noise-induced hearing loss would not occur because individuals would not be exposed to noise for the duration at which loss could occur. • New facilities and family housing would be constructed to achieve an indoor noise level of DNL 45 dBA or less. <p>Alternative B</p> <ul style="list-style-type: none"> • Noise modeling for Alternative B indicated there was no discernable difference in Alternative B noise contours and noise exposure when compared to Alternative A. <p>No Action Alternative</p> <ul style="list-style-type: none"> • 256 off-Base persons who would continue to be exposed to DNL 65 dBA and greater equate to 0.6 percent of the persons who live within a 5-mile radius of the airfield.
Land Use
<p>Alternative A</p> <ul style="list-style-type: none"> • On-Base land use conflicts would not occur because land use categories in the General Plan were developed by considering the proposed ISR/Strike activities. • Planned facilities would not interfere with existing procedures for access to non-Air Force land between Andersen AFB, the Pacific Ocean, and the Philippine Sea. • Andersen AFB would provide the noise contours and land use sections of this EIS to local planning agencies to serve as an interim Air Installation Compatible Use Zone (AICUZ) report and would update the 2001 AICUZ Study to identify potential land use incompatibility from aircraft noise within 1 year after the completed mission change. • Housing for construction workers who may temporarily relocate to Guam would be determined by GovGuam regulations. <p>Alternative B</p> <ul style="list-style-type: none"> • The summary for Alternative A applies to Alternative B. <p>No Action Alternative</p> <ul style="list-style-type: none"> • Routine facilities actions would be accomplished in accordance with the Base's General Plan. • Andersen AFB would prepare an update to the 2001 AICUZ Report to identify potential land use incompatibility from aircraft noise.

**Table ES-1 Summary of Environmental Impacts for Establishment of the
ISR/Strike Capability (*continued*)**

Infrastructure and Utilities

Alternative A

- Water consumption would be about 20 percent of system capacity.
- The wastewater treatment plant (WWTP) would operate at 82 percent of capacity. The Base would continue negotiating with the Guam Water Authority to determine the amount of wastewater the Base will be allowed to send to the WWTP.
- Electricity consumption would equate to approximately 4 percent of the Guam power Authority (GPA) generation capacity. Where practicable, facilities would be constructed in an energy-efficient and sustainable manner.
- The loss of the three wells that inject storm water into the aquifer should not present a problem because there are other nearby wells that are currently under capacity and to which storm water can be channeled. New designs that incorporate devices to increase ponding and retention (pre-treatment) would be implemented. New oil/water separator systems would also be required. Construction contractors would ensure an Environmental Protection Plan (EPP) is prepared, provided to Andersen AFB for submittal to Guam Environmental Protection Agency (Guam EPA), and approved before initiating activities.
- Based on current disposal rates, the Base landfill would reach capacity by December 2007, regardless of the Alternative A activities. A study is currently being conducted to investigate the possibility of vertically extending the current landfill for use beyond 2009. The study is scheduled for completion in January 2007. Thus, Andersen AFB plans to use the expanded on-Base landfill until 2009 or later if the current study supports expansion, and then use a permitted landfill. Although it is not known at this time which landfill would be used, there are three possible options: (1) the proposed GovGuam landfill after it becomes available in 2009-2010; (2) the on-Base landfill that would be constructed as an ISR/Strike project; and (3) the Navy landfill. Planning for the GovGuam and ISR/Strike landfills has not progressed to the point where the capacities or life spans are known. Therefore, quantitative analysis of the impact of the ISR/Strike project on the landfill cannot be accomplished. The Base would submit the permit application for Guam EPA coordination for the ISR/Strike landfill project. All green waste would continue to be segregated and collected for mulching, chipping, and composting or burned in small piles on site after obtaining a burning permit from the local fire department. Andersen AFB would continue its aggressive pollution prevention and recycling program to divert solid waste.
- Construction contracts would require the contractor to recycle construction and demolition debris to the maximum extent possible.
- The level of service (LOS) for the intersection of Arc Light Boulevard and Highway 1 and Route 9 at the Main Gate would be LOS C or better during the peak hours of traffic. At LOS C most experienced drivers are comfortable, roads remain safely below but efficiently close to capacity, and posted speed is maintained. Traffic at the intersection of the Commercial Gate and Route 9 would operate at LOS B or better. Some congestion and impingement of maneuverability occur at LOS B and two motorists might be forced to drive side by side, limiting lane changes.

Alternative B

- Water consumption would be about 17 percent of system capacity.
- The WWTP would operate at 82 percent of capacity. The negotiation analysis for Alternative A applies.
- Electricity consumption would equate to approximately 4 percent of the GPA generation capacity. The energy efficiency analysis for Alternative A applies.
- Alternative A storm water, landfill, pollution prevention, recycling, traffic discussions apply.

No Action Alternative

- Water consumption would be about 13 percent of the system capacity.
- The WWTP would continue to operate at 79 percent of capacity.
- The Base would continue to consume electricity at a rate that equates to about 4 percent of the GPA generation capacity.
- Storm water would be managed using existing procedures, and runoff would continue at existing rates.
- Based on current disposal rates, the Base landfill would reach capacity by December 2007. A study is currently being conducted to investigate the possibility of vertically extending the current landfill for use beyond 2009. The study should be completed in January 2007. Thus, Andersen AFB plans to use the expanded on-Base landfill until 2009 or later if the current study supports expansion, and then use a permitted landfill. Although it is not known at this time which landfill would be used, there are two possible options: (1) the proposed GovGuam landfill after it becomes available in 2009-2010; and (2) the Navy landfill. Planning for the GovGuam and ISR/Strike landfills has not progressed to the point where the capacities or life spans are known. Therefore, quantitative analysis of the impact of the ISR/Strike project on the landfill cannot be accomplished.
- The LOS for the intersection of Arc Light Boulevard and Highway 1 and Route 9 at the Main Gate would remain at LOS B during the peak hours of traffic.

Table ES-1 Summary of Environmental Impacts for Establishment of the ISR/Strike Capability (continued)

Biological Resources
<p>Alternative A</p> <ul style="list-style-type: none">• Approximately 74 hectares (183 acres) of vegetation would be removed for construction of the aircraft staging area (ASA) and Commercial Gate.• Approximately 58 hectares (143 acres) of the 74 hectares can be considered suitable habitat for the listed species. This area amounts to 1.3 percent of the Refuge Overlay and Ritidian Unit of the Guam National Wildlife Refuge.• Indirect effects from facility operation and construction include the loss of between 80 and 147 hectares (197 – 334 acres) of foraging habitat and between 101 and 147 hectares (249 – 363 acres) of foraging/nesting habitat for the various listed species considered in the EIS.• Recreational hunting would no longer be allowed in the ASA due to safety and security reasons after the facility becomes operational.• The potential for off-Base transport of the Brown tree snake (BTS) would be low through use of the procedures in the 36th Wing Instruction 32-7004, Brown Tree Snake Management, which ensures 100 percent inspection of all aircraft and cargo that depart the Base.• Noise levels associated with increased aircraft overflights would incrementally increase over a multi-year period, and would occur over areas important to the Mariana fruit bat and Mariana crow.• With the exception of the Mariana fruit bat, the proposed action may affect, but not adversely affect, populations of existing species as well as recovery of species populations. One known Mariana fruit bat foraging area would be removed; however, no adverse modifications to species habitat associated with the proposed action would occur. The effects determination for the proposed action is based on the following assumptions:<ul style="list-style-type: none">• Existing conditions for listed species within habitat areas of the Refuge Overlay continue to degrade. Excessive ungulate pressure prevents recruitment of emergent canopy species within forested areas, while BTS predation limits recovery of listed species.• The size of the areas subject to clearing is relatively small in comparison to available habitat.• Noise from aircraft overflights would affect Mariana fruit bat and Mariana crow recovery efforts, as well as current populations. Based on current literature and field observations, habituation to an incremental increase of overflights would be expected. Further, adverse effects that do become apparent due to aircraft operations would initiate modifications to aircraft ground tracks and profiles over sensitive areas through an adaptive management strategy. This adaptive management strategy would involve multi-year monitoring of noise effects using up-to-date standards for acoustical studies on sensitive species that would affect operational changes.• Implementation of the conservation measures described in Chapter 2 would reverse the continued degradation of approximately 200 hectares (494 acres) of important habitat, and therefore, contribute to the recovery of listed species. Many of the conservation measures correspond directly to management needs identified as critical recovery actions in the U.S. Fish and Wildlife Service (USFWS) recovery plans for listed species. Additionally, the conservation measures would effectively manage areas of higher quality habitat for listed species. Therefore, the species may utilize the better-quality habitat that would be effectively enhanced by the conservation measures, rather than the relatively lower-quality habitat currently present at Andersen main.• Formal consultation with USFWS under Section 7 of the Endangered Species Act (ESA) resulted in the issuance of a Biological Opinion (BO), which concluded that the ISR/Strike project is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Micronesian kingfisher, Guam rail, or other off-site species listed under the ESA. An incidental take statement, as part of the BO, anticipates the harm of one Mariana fruit bat, mortality of 21 fruit bats on Guam, mortality of 36 fruit bats on Rota, and the harassment of two colonies. This determination is based on the conservation measures associated with Alternative A, as well as Air Force commitments to non-discretionary measures in the BO that seek to minimize disturbance, injury, and death to Mariana fruit bats due to the ISR/Strike project. Take is not anticipated for the other species considered in the analysis of this EIS.

Table ES-1 Summary of Environmental Impacts for Establishment of the ISR/Strike Capability (continued)

<p>Alternative B</p> <ul style="list-style-type: none"> The summary for Alternative A applies to Alternative B. <p>No Action Alternative</p> <ul style="list-style-type: none"> No land clearing would occur northwest of the runways at Andersen main, and there would be no reduction in land identified as the Guam National Wildlife Refuge Overlay. Plant and animal species resources, which include threatened and endangered species, would not change from current conditions Natural resources would continue to be managed by the Base's Integrated Natural Resources Management Plan
<p>Groundwater Resources</p>
<p>Alternative A</p> <ul style="list-style-type: none"> Water withdrawal from the aquifer would be about 7 percent of the daily water withdrawn from the aquifer. The use of erosion control techniques would minimize the potential for groundwater contamination. Base personnel would continue to monitor all construction activity and require an environmental protection plan that identifies the actions necessary to reduce or preclude surface contamination from entering the storm water injection wells. <p>Alternative B</p> <ul style="list-style-type: none"> Water withdrawal from the aquifer would be about 6 percent of the daily water withdrawn from the aquifer. The erosion control and monitoring discussion for Alternative A applies. <p>No Action Alternative</p> <ul style="list-style-type: none"> Water withdrawal from the aquifer for Base activities is about 6 percent of total daily water withdrawal from the aquifer. The use of erosion control techniques minimizes the potential for groundwater contamination.
<p>Earth Resources</p>
<p>Alternative A</p> <ul style="list-style-type: none"> New facilities would be constructed to ensure structural stability due to the potential for seismic activity on Guam. Erosion control measures identified in the EPP that would be prepared and implemented by the construction contractor would minimize erosion. Local government clearances from the Department of Agriculture, Department of Parks and Recreation, and the Guam Historic Preservation Office would be obtained prior to commencement of earthmoving activities. <p>Alternative B</p> <ul style="list-style-type: none"> The summary for Alternative A applies to Alternative B. <p>No Action Alternative</p> <ul style="list-style-type: none"> Use of the erosion control measures identified in the Base's Stormwater Pollution Prevention Plan minimizes erosion.
<p>Hazardous Materials and Waste</p>
<p>Alternative A</p> <ul style="list-style-type: none"> Contractors would manage hazardous waste and hazardous materials in accordance with Andersen AFB, local, and federal guidance, and would be responsible for the storage, treatment, disposal, and transportation off-Guam of any hazardous waste and hazardous materials that has an expired shelf life, is outdated, unopened, and/or unused. It is not likely that new hazardous waste streams would occur because of the similarity between the aircraft that currently operate from the Base and those expected with Alternative A. The existing hazardous waste management processes and procedures should accommodate the waste generated under Alternative A. However, Andersen AFB would increase the 90-day waste storage capacity because the volume of hazardous waste would increase with the addition of as many as 70 aircraft. The construction contractor would coordinate with Andersen AFB and would be responsible for handling and disposal of any Installation Restoration Program (IRP)-related material, including a site that is built on top of a known IRP or military munitions response site that has not been completed under the remedial action process. Construction projects would not hinder access to current IRP sites, areas of concern, other contaminated areas, monitoring wells, and remedial systems for sampling and operation and maintenance activities. Average daily jet fuel consumption would equate to about 0.1 percent of the Base's fuel storage capacity. <p>Alternative B</p> <ul style="list-style-type: none"> The summary for Alternative A applies to Alternative B. <p>No Action Alternative</p> <ul style="list-style-type: none"> Hazardous media and the IRP would continue to be managed using current procedures and guidance.

Table ES-1 Summary of Environmental Impacts for Establishment of the ISR/Strike Capability (continued)

Cultural Resources
<p>Alternative A</p> <ul style="list-style-type: none"> The Air Force completed the Section 106 process with the Guam State Historic Preservation Office (GSHPO) and accomplished cultural resource surveys in the previously unsurveyed area in which ISR/Strike facilities would be constructed. A report of findings and management recommendations for these properties was submitted to the GSHPO. Based on review of the Executive Summary of the cultural resources inventory, the GSHPO responded that "further archaeological investigation on prehistoric sites at ISR/Strike will not provide any new information about the project area, but such an investigation will only be redundant to what we already know about the project." <p>Alternative B</p> <ul style="list-style-type: none"> The summary for Alternative A applies to Alternative B. <p>No Action Alternative</p> <ul style="list-style-type: none"> Cultural resources would continue to be managed in accordance the Base's Integrated Cultural Resources Management Plan (ICRMP).
Socioeconomic Resources
<p>Alternative A</p> <ul style="list-style-type: none"> Base population would increase by an overall 3,000 persons when considering military personnel and dependents. Construction of on-Base family housing units and dormitories would accommodate the additional personnel. Off-Base population would temporarily increase due to construction activities because as many as 1,800 skilled U.S. workers from elsewhere in the U.S. would be necessary due to the shortage of local labor on Guam. Additional housing for skilled U.S. workers from elsewhere in the U.S. would need to be augmented and supplied from alternative housing sources. The addition of as many as 440 elementary/middle school students to the existing enrollment would exceed the school capacity by about 218 students. The addition of as many as 110 high school students would exceed the school capacity by about 95 students. One of the ISR/Strike projects would construct a Department of Defense Education Activity (DoDEA) high school, which would accommodate the additional high school students. Vacated space in the existing high school could be used to accommodate the additional elementary/middle school students. The addition of personnel would increase wages paid, business sales, and income to the local economy.
<p>Alternative B</p> <ul style="list-style-type: none"> Base population would increase an overall 1,850 persons. Use of the current inventory of on-Base family housing units and construction of dormitories would accommodate the additional personnel. Dormitories would be constructed to accommodate additional unaccompanied personnel. Off-Base population would temporarily increase due to construction activities because as many as 1,600 skilled U.S. workers from elsewhere in the U.S. would be necessary. The addition of as many as 70 elementary/middle school students to the existing enrollment would expand the student population, but not exceed capacity. The addition of as many as 20 high school students would exceed the school capacity by about five students. The ISR/Strike DoDEA high school project would accommodate the additional high school students. The summary for off-Base housing for skilled U.S. workers from elsewhere in the U.S., wages, business sales, and income for the local economy for Alternative A applies. <p>No Action Alternative</p> <ul style="list-style-type: none"> There would be no change to the population, housing, education, or economic conditions.

Airfield Operations, Aircraft Safety, and Bird/Wildlife Aircraft Strike Hazard

Alternative A

- The airfield could accommodate the approximate 45 percent increase in aircraft operations.
- Additional arrival, departure, and closed pattern flight tracks and related air traffic control procedures would be added to Runway 06Left/24Right for use by the ISR/Strike fighter aircraft.
- The aircraft flight profiles associated with the ISR/Strike aircraft would not be affected by, nor would they affect, the restrictions that limit aircraft overflight of Munitions Storage Area 1, Mariana crow territories, and the Mariana fruit bat colony.
- The probability is low that an aircraft involved in an accident at or around the Andersen AFB airfield would strike a person or structure on the ground.
- Approximately four annual bird/wildlife aircraft strikes would occur. It is unlikely any of these bird/wildlife aircraft strike incidents would result in an aircraft accident, involve injury to aircrews or to the public, or damage to property (other than the aircraft).
- Flight regimes of the Mariana crow and Mariana fruit bat and the altitudes of aircraft provide sufficient separation so strikes with aircraft would not occur.

Alternative B

- The airfield could accommodate the approximate 41 percent increase in aircraft operations.
- The summary for Alternative A applies to Alternative B.

No Action Alternative

- The existing air traffic control procedures accommodate the 85,734 annual airfield operations.
- The existing conditions for aircraft safety and bird/wildlife aircraft strike hazards would continue because there would be no change in the type and level of airfield operations.

Environmental Justice

Alternative A

- Alternative A would not result in any environmental impacts to low-income or minority populations which are disproportionately high or adverse when compared to impacts to the general population. Alternative A would not cause adverse impacts to human health or the environment of neighboring populations. No disproportionately high or adverse effects to minority and low-income populations in the Andersen AFB area would occur because significant environmental impacts would not result.

Alternative B

- The summary for Alternative A applies to Alternative B.

No Action Alternative

- Disproportionately adverse effects to minority and low-income populations would not occur.

Table ES-2 Summary of Cumulative Impacts

Resource	Cumulative Impacts
Noise	Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. Receptors in the vicinity of ISR/Strike and other action facility construction projects could include persons within 100 feet of noise emanating from equipment operating simultaneously at two construction sites. Construction noise would be temporary, would occur only during daytime, and would cease when the project was completed.
Land Use	Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. As with Alternative A, the other facility actions would be accomplished in accordance with the Andersen AFB General Plan. Facility construction and use would be consistent with land use plans and programs identified in the General Plan. None of the other facilities that would be constructed would interfere with existing access to non-Air Force land between Andersen AFB, the Pacific Ocean, and the Philippine Sea. Existing access procedures would be continued.
Air Quality	Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. None of the construction emissions or the full ISR/Strike capability and other action recurring emissions cause a violation of federal standards. A General Conformity Rule Conformity Determination would not be required.
Infrastructure and Utilities	Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. Water consumption would be about 20 percent of system capacity. The WWTP would operate at 82 percent of capacity. The Base would continue negotiating with the GWA to determine the amount of wastewater the Base will be allowed to send to the Northern WWTP. Electricity use would equate to about 4 percent of the GPA generation capacity. The additional impervious cover would equate to a 19 percent increase, and the amount of storm water runoff could increase accordingly. The loss of wells that inject stormwater into the aquifer should not present a problem because there are other nearby wells that are currently under capacity and to which stormwater can be channeled. New designs that incorporate devices to increase ponding and retention (pre-treatment) would be implemented. New oil/water separator systems would also be required. Construction contractors would ensure an EPP is prepared, provided to Andersen AFB for submittal to Guam EPA, and approved before initiating activities. It is estimated the landfill would reach 100 percent capacity by December 2007, regardless of Alternative A and other action activities. A study is currently being conducted to investigate the possibility of vertically extending the current landfill for use beyond 2009. The study is scheduled to be completed in January 2007. Thus, Andersen AFB plans to use the expanded on-Base landfill until 2009 or later if the current study supports expansion, and then use a permitted landfill. Although it is not known at this time which landfill would be used, there are three possible options: (1) the proposed GovGuam landfill after it becomes available in 2009-2010; (2) the on-Base landfill that would be constructed as an ISR/Strike project; and (3) the Navy landfill. Planning for the GovGuam and ISR/Strike landfills has not progressed to the point where the capacities or life spans are known. Therefore, quantitative analysis of the impact of the ISR/Strike project on the landfill cannot be accomplished. The Base would submit the permit application for Guam EPA coordination for the ISR/Strike landfill project. All green waste would continue to be segregated and collected for mulching, chipping, and composting. Andersen AFB would continue its aggressive pollution prevention and recycling program to divert solid waste. One of the other action projects would construct a waste-to-energy (WTE) plant at Andersen AFB. Construction and operation of the facility would reduce the amount of material that would be land filled. It is not possible to determine at this time how much solid waste could be diverted to the WTE plant because planning for the plant has not been initiated. Contracts issued for construction activities would require the contractor to recycle construction and demolition debris to the maximum extent possible. The LOS for the intersection of Arc Light Boulevard and Highway 1 and Route 9 at the Main Gate would be LOS C or better during the peak hours of traffic. Traffic at the intersection of the Commercial Gate and Route 9 would operate at LOS B or better.

Table ES-2 Summary of Cumulative Impacts (*continued*)

Resource	Cumulative Impacts
Biological Resources	<p>Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. Under Alternative A and other actions, 122.7 hectares (303.2 acres) of vegetated land would be subject to removal, which represents 2.7 percent of the Refuge Overlay and the Ritidian Unit of the Guam National Wildlife Refuge. Removal of habitat for ungulates and exotic predators would displace these species into adjacent habitats. The cumulative effects of noise on Mariana fruit bats and Mariana crows include periodic noise events from training activities in Northwest Field, as well as an incremental increase in aircraft overflights at Andersen main. No action of Alternative A or other actions would affect Area 50, or the proposed Habitat Management Unit (HMU); therefore, recovery efforts would not be affected. Because clearing activities and noise events occur in areas suitable for foraging and roosting/nesting for the Mariana fruit bat, Mariana crow, and potential habitat for recovery of other species, cumulative actions may affect listed species. Construction associated with the ASA would impact a known female Mariana fruit bat foraging area. Therefore, clearing for the ASA would represent an adverse effect. This forest removal would not jeopardize the continued existence of the Mariana fruit bat or adversely modify overall habitat.</p> <p>Conservation measures of Alternative A and other actions, however, reduce adverse effects. Under Alternative A and other actions, 336 hectares (830 acres) would be subject to ungulate enclosure fencing and ungulate depredation hunting. Of these 336 hectares (830 acres), Area 50 (22 hectares or 54 acres) and the new HMU (60 hectares or 148 acres) would be subject to exotic predator control with suitable exotic predator enclosure fencing. Conservation measures seek to create alternative habitat for Mariana fruit bats and Mariana crows by outplanting of foraging plots within enclosure areas. BTS control would be put into place at Pati Point, along with the 36th Wing Instruction 32-7004 (100 percent inspection of outbound flights).</p> <p>Pursuant to §7 of the Endangered Species Act, the foreseeable cumulative effects would not result in any demonstrable adverse consequences.</p>
Groundwater Resources	<p>Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. Water withdrawal from the aquifer would increase by 1.15 percent and the resulting withdrawal would be 7 percent of the daily water withdrawn from the aquifer. The use of erosion control techniques and monitoring storm water during construction and after the projects are completed would minimize the potential for groundwater contamination.</p>
Earth Resources	<p>The types of construction activities associated with the other actions would be nearly identical to those for Alternative A. Therefore, the discussion and analysis for Alternative A applies to the cumulative impact analysis.</p>
Hazardous Materials and Waste	<p>The construction contractor for other projects would be required to comply with the regulatory requirements identified for the No Action Alternative and Alternative A. Although some of the other actions may be adjacent to a project site under the No Action Alternative and Alternative A, use of regulatory requirements identified for these alternatives would minimize the potential for cumulative impacts. When completed, activities at the other facilities would be managed in accordance with applicable environmental plans and policies.</p>
Cultural Resources	<p>The ISR/Strike project is one of a number of other planned projects involving construction on Andersen AFB. The potential for cumulative impacts from the ISR/Strike and other actions is minimal based on the distance between project sites, especially for the Northwest Field project. Additionally, the Air Force accomplished the Section 106 process for the Northwest Field project. The potential for cumulative impacts between the ISR/Strike projects and other projects would be prevented or minimized through implementation of the procedures identified in the Andersen AFB ICRMP. When combining the other actions with the ISR/Strike project through the consultation process, no cumulative adverse effects on significant cultural resources, including visual resources, would occur.</p>

Table ES-2 Summary of Cumulative Impacts (*continued*)

Resource	Cumulative Impacts
Socioeconomic Resources	<p>Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. On-Base population would increase by 4,248 personnel when considering military personnel, dependents, and students undergoing training. Off-Base population would temporarily increase for the duration of the construction activities because importing as many as 2,080 contract workers would be necessary due to the shortage of local labor on Guam. Nearly all the inventory of 484 off-Base housing units would be needed to meet the shortfall of 474 on-Base family housing units. The addition of as many as 765 elementary/middle school students to the existing enrollment would exceed the school capacity by about 543 students. The addition of as many as 185 high school students to the existing enrollment would exceed the school capacity by about 170 students. The ISR/Strike DoDEA high school project would accommodate the additional high school students. Vacated space in the existing high school should be able to accommodate the additional elementary/middle school students. Should additional space be needed, portable buildings similar to those used by public school districts could be used to alleviate overcrowding. Employment generated by construction activities would result in wages paid, and increase expenditures for local and regional services and supplies during construction. The addition of 1,100 personnel authorizations would result in an increase in wages paid, business sales, and income to the local and regional economy.</p>
Airfield Operations, Aircraft Safety, and Bird/Wildlife Aircraft Strike Hazard	<p>None of the other actions proposed at Andersen AFB include aircraft basing or airfield operations. Therefore, no cumulative airfield operations, aircraft safety, or bird/wildlife aircraft strike impacts would occur.</p>
Environmental Justice	<p>None of the other actions would have the potential for off-Base noise. Establishment and operation of the ISR/Strike capability, when combined with other planned projects, would not contribute cumulative impacts to minority or low-income populations in the area.</p>

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ACRONYMS AND ABBREVIATIONS

$\mu\text{g}/\text{m}^3$	microgram(s) per cubic meter
36 WI 32-7004	36th Wing Instruction 32-7004, <i>Brown Tree Snake Management</i>
AFB	Air Force Base
AFI	Air Force Instruction
AGE	aerospace ground equipment
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
ANSI	American National Standards Institute
AOC	area of concern
APE	area of potential effects
APZ	accident potential zone
AQCR	air quality control region
ASA	aircraft staging area
ATCAA	air traffic control assigned airspace
ATSDR	Agency for Toxic Substances and Disease Registry
BA	biological assessment
BAI	backup aircraft inventory
BASH	Bird/Wildlife Aircraft Strike Hazard
bgs	below ground surface
BO	Biological Opinion
BOD ₅	5-day biochemical oxygen demand
BRAC	Base Realignment and Closure Commission
BSP	Bureau of Statistics and Plans
BTS	brown tree snake
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CITS	Combat Information Transport System
CNMI	Commonwealth of the Northern Mariana Islands
CRMA	cultural resource management area
CY	cubic yard
CZ	clear zone
CZMA	Coastal Zone Management Act
DAWR	Guam Department of Agriculture Division of Aquatic and Wildlife Resources
dB	decibel
dBA	A-weighted sound level measured in decibels
DNL	day-night average sound level
DoD	Department of Defense
DoDEA	Department of Defense Education Activity
DRMO	Defense Reutilization Marketing Office

EA	environmental assessment
EIAP	environmental impact analysis process
EIFS	Economic Impact Forecast System
EIS	environmental impact statement
EO	executive order
EOD	explosives ordnance disposal
EPP	Environmental Protection Plan
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDM	Farallon de Medinilla
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
ft ²	square foot
FY	fiscal year
GBU	Guided Bomb Unit
GBU	guided bomb unit
GCMP	Guam Coastal Management Program
GNWR	Guam Natural Wildlife Refuge
GOV	government-owned vehicle
GovGuam	Government of Guam
GPA	Guam Power Authority
gpd	gallons per day
gpm	gallons per minute
GPS	global positioning system
Guam EPA	Guam Environmental Protection Agency
GWA	Guam Waterworks Authority
HAP	hazardous air pollutant
HMU	habitat management unit
HSC-25	Helicopter Combat Support Squadron 25
HUD	United States Department of Housing and Urban Development
ICRMP	Integrated Cultural Resources Management Plan
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
ISR	intelligence, surveillance, and reconnaissance
JDAM	Joint Direct Attack Munition
kV	kiloVolt
kWH	kiloWatt-hours
L _{max}	maximum sound level
LOS	level of service
Marianas Training EIS	<i>Military Training in the Marianas Environmental Impact Statement</i>

mgd	million gallons per day
MILCON	military construction
MOA	military operations area
MOU	Memorandum of Understanding
MSA	munitions storage area
MSL	mean sea level
MSW	municipal solid waste
MTR	military training range
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLR	noise level reduction
NM	nautical mile
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O&M	operations and maintenance
PAA	primary assigned aircraft
PACAF	Pacific Air Forces
pCi/L	picoCuries per liter
PL	public law
POV	privately owned vehicle
ppm	parts per million
PSD	prevention of significant deterioration
QDR	Quadrennial Defense Review
RAIF	resource adverse impact footprint
RCRA	Resource Conservation and Recovery Act
RED HORSE	Rapid Engineer Deployable Heavy Operational Repair Squadron Engineer
RTV	rational threshold value
SDB	Small Diameter Bomb
SEL	sound exposure level
GSHPO	Guam State Historic Preservation Office
SWMU	solid waste management unit
SWPPP	Storm Water Pollution Prevention Plan
T&E	threatened and endangered
TALCE	Transportable Airlift Control Element
the Base	Andersen AFB
TMDL	Total Maximum Daily Loads
tpd	tons per day
tpy	tons per year
TRIMS	Training Range Information Management System

U.S.	United States
UCLA	University of California at Los Angeles
UIC	underground injection control
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USC	U.S. Code
USDA	U.S. Department of Agriculture
USDOC	U.S. Department of Commerce
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UXO	unexploded ordnance
WTE	waste-to-energy
WWTP	wastewater treatment plant

GLOSSARY

Administrative Record	A record of all documents (hard copies, electronic files, briefing charts, files, photographs, or other documents and records) relied upon in preparing a NEPA document. The administrative record documents the proponent's consideration of all relevant and reasonable factors and should include evidence of diverging opinions and criticisms of the proposed action or its reasonable alternatives.
Air Pollutant	Generally, an airborne substance that could, in high enough concentrations, harm living things or cause damage to materials. From a regulatory perspective, an air pollutant is a substance for which emissions or atmospheric concentrations are regulated or for which maximum guideline levels have been established due to potential harmful effects on human health and welfare.
Air Quality	The cleanliness of the air as measured by the levels of pollutants relative to standards or guideline levels established to protect human health and welfare. Air quality is often expressed in terms of the pollutant for which concentrations are the highest percentage of a standard.
Aquifer	A water-bearing bed or layer of permeable rock, sand, or gravel capable of yielding large amounts of water.
Area of Potential Effect	A term used in Section 106 to describe the area in which historic resources may be affected by a federal undertaking.
Baseline	The existing environmental conditions against which impacts of the proposed action and its alternatives can be compared.
Best Management Practices	Resource management decisions and/or actions that are based on the latest professional and technical standards for the protection, enhancement, and rehabilitation of natural and cultural resources.
Biological Assessment	The gathering and evaluation of information on proposed endangered and threatened species and critical habitat and proposed critical habitat. Required when a management action potentially conflicts with endangered or threatened species, the biological assessment is the way federal agencies enter into formal consultation with the Fish and Wildlife Service and describe a proposed action and the consequences to the species the action would affect.
Biological Oxygen Demand BOD₅	The amount of dissolved oxygen consumed in five days by biological processes breaking down organic matter.
Coastal Zone	Lands and waters adjacent to the coast that exert an influence on the uses of the sea and its ecology, or whose uses and ecology are affected by the sea.
Code of Federal Regulations (CFR)	Document that codifies all rules of the executive departments and agencies of the federal government. It is divided into fifty volumes, known as titles. Title 40 of the CFR (referenced as 40 CFR) lists all environmental regulations.
Comment Period	Time provided for the public to review and comment on a proposed EPA action or rulemaking after publication in the Federal Register.
Community	An assemblage of plant and animal populations in a common spatial arrangement.

GLOSSARY (continued)

Cooperating Agency	Any Federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action significantly affecting the quality of the human environment.
Council on Environmental Quality	Established under Title II of NEPA to develop Federal agency-wide policy and regulations for implementing the procedural provisions of NEPA, resolve interagency disagreements concerning proposed major Federal actions, and to ensure that Federal agency programs and procedures are in compliance with NEPA.
Critical Habitat	Habitat essential to the conservation of an endangered or threatened species that has been designated as critical by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service following the procedures outlined in the Endangered Species Act and its implementing regulations (50 CFR 424).
Cultural Resource	The fragile and nonrenewable remains of human activity that are found in historic districts, sites, buildings, and artifacts and that are important in past and present human events.
Cumulative Impacts or Effects	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time
Emission	Pollution discharged into the atmosphere from smokestacks, other vents, and surface areas of commercial or industrial facilities; from residential chimneys; and from motor vehicle, locomotive, or aircraft exhausts.
Endangered Species	Any species that is in danger of extinction throughout all or a significant portion of its range
Environmental Assessment (EA)	A concise public document that serves to : Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. Aid an agency's compliance with the Act when no environmental impact statement is necessary. Facilitate preparation of a statement when one is necessary.
Environmental Impact Statement (EIS)	The detailed statement required by section 102(2)(C) of NEPA which an agency prepares when its proposed action significantly affects the quality of the human environment
Environmental Justice	The fair treatment of people of all races, cultures, incomes, and educational levels with respect to the development and enforcement of environmental laws, regulations, and policies.
Finding of No Significant Impact (FONSI)	A document by a Federal agency briefly presenting the reasons why an action, not otherwise excluded, will not have a significant effect on the human environment and for which an Environmental Impact Statement therefore will not be prepared. It shall include the environmental assessment or a summary of it and shall note any other environmental documents related to it.

GLOSSARY (continued)

Geographic Information System	A computer system that enables a person to process natural resources and a variety of other spatially referenced data collected from various surveys and inventories. High quality color maps and management documents can be conveniently produced and manipulated and used for data and inventory management, education, and a variety of planning purposes.
Groundwater	Water that has percolated downward from the ground surface through the soil pores.
Guam State Historic Preservation Officer	The official who (among other duties) consults with federal agencies during Section 106 review. The SHPO administers the national historic preservation program at the state level, reviews National Register nominations, and maintains file data on historic properties that have been identified but not yet nominated. Agencies seek the views of the appropriate SHPO(s) while identifying historic properties and assessing effects of an undertaking on historic properties.
Habitat	The natural abode of a plant or animal, including all biotic, climatic, and soil factors affecting life.
Habitat Management Unit	A tract of land established for biological resources studies.
Hazardous	Substances that are potentially harmful to human health or the environment. <i>Hazardous Wastes</i> - A compound or compounds remaining for disposal or reclamation after use or after release to the environment.
Integrated Cultural Resources Management Plan (ICRMP)	A plan that defines the process for the management and protection of cultural resources on military installations.
Integrated Natural Resources Management Plan (INRMP)	A plan written to provide an overall framework and approach for managing, monitoring, protecting, and utilizing natural resources on military installations. These plans typically use an ecosystem-based approach to support sustainable military use of installation lands, while protecting and enhancing resources for multiple use, sustainable yield, and biodiversity.
Landfill	A waste management unit at which waste is discharged in or on land for disposal.
Lead Agency	The agency or agencies preparing, or taking primary responsibility for preparing, the Environmental Impact Statement.
Level of Service (LOS)	A qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience.
Mitigation	Lessening the effects to natural or cultural resources caused by implementation of projects or activities that result in adverse impacts. Mitigation can include limiting the magnitude of the action; repairing, rehabilitating, or restoring the affected resource; avoiding the effect altogether; reducing or eliminating the effect over time by preservation and maintenance operations during the life of the action; and/or compensating for the effect by providing substitute resources or environments.

GLOSSARY (continued)

National Environmental Policy Act (NEPA)	The federal law, going into effect on January 1, 1970, that established a national policy for the environment and requires federal agencies (1) to become aware of the environmental ramifications of their proposed actions, (2) to fully disclose to the public proposed federal actions and provide a mechanism for public input to federal decision making, and (3) to prepare environmental impact statements for every major action that would significantly affect the quality of the human environment.
National Historic Preservation Act (NHPA)	The basic legislation of the national historic preservation program that established the Advisory Council on Historic Preservation and the Section 106 review process.
National Pollutant Discharge Elimination System (NPDES)	A process for controlling the amount of pollution discharged into waters by requiring polluters to obtain NPDES permits from the states involved and to comply with discharge standards. The NPDES is mandated by the Federal Water Pollution Control Act Amendments.
National Register of Historic Places	The official list, established by the Historic Preservation Act of 1966, of the Nation's cultural resources worthy of preservation. The National Register lists archeological, historic, and architectural properties (districts, sites, buildings, structures, and objects) nominated for their local, state, or national significance by state and federal agencies and approved by the National Register Staff. The National Register is maintained by the National Park Service.
Natural Resources	All elements of nature and their environments of soil, air, and water. Those consist of two general types: earth resources, which consist of the nonliving resources such as minerals, water, and soil components and biological resources, which consist of living resources such as plants and animals.
NEPA Process	The objective analysis of an action to determine the degree of its environmental impact on the natural and physical environment; alternatives and mitigation that reduce that impact; and full and candid presentation of the analysis to, and involvement of, the interested and affected public. NEPA process may also be referred to generally as environmental review.
No Action alternative	Under NEPA, an alternative that provides a benchmark for comparison, enabling decision-makers to compare the magnitude of the environmental effects of the various alternatives.
Notice of Intent (NOI)	The NOI describes the proposed action, possible alternatives, and the proposed NEPA scoping process. It states the name and address of a person within GSA who can answer questions about the proposed action and EIS.
Proposed Action	The alternative that the Lead Agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors.

GLOSSARY (continued)

Record of Decision (ROD)	A public document signed by the agency decision maker at the time of a decision. The ROD states the decision, alternatives considered, the environmentally preferable alternative or alternatives, factors considered in the agency's decision, mitigation measures that will be implemented, and a description of any applicable enforcement and monitoring programs.
Scoping	An early and open process for determining the scope of issues to be addressed in an environmental impact statement and for identifying the significant issues related to a proposed action. Scoping may involve public meetings; field interviews with representatives of agencies and interest groups; discussions with resource specialists and managers; and written comments in response to news releases, direct mailings, and articles about the proposed action and scoping meetings.
Section 106 Compliance	The requirement of Section 106 of the National Historic Preservation Act that any project funded, licensed, permitted, or assisted by the Federal Government be reviewed for impacts to significant historic properties and that the State Historic Preservation Officer and the Advisory Council on Historic Preservation be allowed to comment on a project.
Section 7 Consultation	The requirement of Section 7 of the Endangered Species Act that all federal agencies consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service if a proposed action might affect a federally listed species or its critical habitat.
Solid Waste	Any non-hazardous garbage, refuse or sludge, which is primarily solid, but could also include portions of liquid, semi-solid or contained gaseous material resulting from residential, industrial, commercial, agricultural, mining operations, and community activities.
Storm Water Pollution Prevention Plan	Developed and implemented to address specific storm water discharge concerns for construction sites.
Threatened Species	Any plant or animals species likely to become endangered within the foreseeable future throughout all or a part of its range and designated by the U.S. Fish and Wildlife Service under the Endangered Species Act.
Ungulates	Hoofed animals, including ruminants but also horses, tapirs, elephants, rhinoceroses, and swine.
Vegetative Community	An assemblage of plant populations in a common spatial arrangement.
Wetlands	Areas that are inundated or saturated by surface or ground water often and long enough to support and under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions.

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CHAPTER 1 PURPOSE OF AND NEED FOR ACTION

This chapter provides a statement of the purpose and need for action and the scope of the environmental review.

1.1 PURPOSE OF AND NEED FOR ACTION

The 2001 Quadrennial Defense Review (QDR) noted that the Asian region has become increasingly important to regional and United States (U.S.) security in recent years. In response, the Department of Defense's (DoD) new planning construct calls for maintaining regionally tailored forces, forward stationed and deployed in the Asian theater. This action would assure allies and friends, counter coercion, and deter aggression against the U.S., its forces, allies, and friends. A multifaceted approach requires forces and capabilities that provide the President with a wider range of military options to discourage aggression or any form of coercion. In particular, it places emphasis on peacetime forward deterrence in critical areas of the world. It requires enhancing the future capability of forward deployed and stationed forces, coupled with global intelligence, strike, and information assets, in order to deter aggression or coercion with only modest reinforcement from outside the theater. One of the goals of reorienting the global posture is to render forward forces capable of swiftly defeating an adversary's military and political objectives with only modest reinforcement.

U.S. forces currently lack sufficient access to Asia. The U.S. military has insufficient bases, facilities, pre-positioned equipment, coalition arrangements, and other assets needed for operations along the Asian crescent from Southeast Asia northward to Okinawa and Japan. For example, withdrawal from the Philippines in the early 1990s left the U.S. military with no major air and naval bases in Southeast Asia. Additionally, in Asia, the large American presence in Korea and Japan may be rendered obsolete if Korean reconciliation ends the heightened threat of war with North Korea.

The 2001 QDR directed the Air Force to expand basing in the Pacific region with a regionally tailored, multifaceted force able to respond quickly to defeat an adversary's military and political objectives. In response, the Air Force proposes to locate intelligence, surveillance, and reconnaissance (ISR), strike, and aerial refueling aircraft and personnel in the western Pacific as part of the U.S. Pacific Command's ISR/Strike capability (ISR/Strike). The ISR/Strike capability would be able to respond more timely and effectively. The objective of the ISR/Strike capability would be to achieve pre-engagement battle space awareness, locate and identify critical adversary moves, achieve assured success through air dominance, and deliver decisive effects via persistent and precise application of air and space power. (The proposal to establish an ISR/Strike capability was developed prior to the 2005 Base Realignment and Closure Commission [BRAC] process, and the ISR/Strike capability is not part of the decisions from that process).

Andersen Air Force Base (AFB), Guam was identified as the installation best suited to host the ISR/Strike capability in a process driven by the 2001 QDR and a consideration of six installations in the Pacific Air Forces' area of responsibility. An additional process considered

whether the status of the aircraft and personnel associated with the ISR/Strike capability should be permanently based or rotated, or a combination of the two options.

1.2 SCOPE OF THE ENVIRONMENTAL REVIEW

The National Environmental Policy Act (NEPA) of 1969, as amended, requires federal agencies to consider environmental consequences in the decision-making process. The President's Council on Environmental Quality (CEQ) issued regulations to implement NEPA that include provisions for both the content and procedural aspects of the required environmental analysis. The Air Force Environmental Impact Analysis Process (EIAP) is accomplished through adherence to the procedures set forth in CEQ regulations (40 Code of Federal Regulations [CFR] Part 1500) and 32 CFR Part 989 (*Air Force Environmental Impact Analysis Process*). These federal regulations establish both the administrative process and substantive scope of the environmental impact evaluation designed to ensure that deciding authorities have a proper understanding of the potential environmental consequences of a contemplated course of action. The Air Force is preparing this Environmental Impact Statement (EIS) to determine the potential environmental consequences associated with the establishment of the ISR/Strike capability at Andersen AFB (the Base). The EIS entitled *Military Training in the Marianas* (Marianas Training EIS) (USPACOM 1999) is incorporated by reference (consistent with 40 CFR §1502.21) and discussed, as required, in various sections of this EIS. The capability of Farallon de Medinilla (FDM) to support Air Force proposed operations and associated impacts post-ISR/Strike beddown would be ripe for evaluation in the Mariana Islands Range Complex EIS, which is anticipated to be completed in FY09 during operational phase Phase 0 (see Subchapter 2.2). Analysis of the proposed ISR/Strike training operations at FDM is not possible at this time because the training requirements have not been finalized.

The establishment of the operational capability operation of ISR/Strike at Andersen AFB would take place in phases over a period of time spanning as many as 16 years. Because of the time span involved as well as other factors, overall only some aspects of the proposed action are currently ripe for decision because of incomplete information. Thus, the Air Force is preparing this EIS to focus on those issues now ripe for decision, which include all elements of the ISR/Strike capability except for items such as aircrew training (see Subchapter 1.2.2), wastewater treatment, and landfill space. As previously mentioned, analysis for the aircrew training should be completed in FY09 when the Navy completes the Mariana Islands Range Complex EIS. Analysis of wastewater treatment could be finalized after the wastewater treatment plant permitting process is completed by the Government of Guam (GovGuam). Landfill analysis may be completed after the current Andersen AFB landfill study is completed in FY07 and when the GovGuam finalizes its landfill project. Because the ISR/Strike capability is planned for a 16-year implementation period, it is possible that details associated with the proposed action assessed in this EIS could change. Additional details may become available during the implementation period, or plans could change due to factors

Draft EIS Comment: The DEIS does not analyze the "departure of personnel and aircraft from the installations that would be the source for the personnel and aircraft that would be part of the ISR/Strike capability." ...the DEIS states merely that analysis of the impacts would be carried out by the "losing organization(s)." This is a classic case of segmentation....

Response: Analysis of the locations from which the ISR/Strike aircraft would be sourced (e.g., where the aircraft originate) is not within the scope of this EIS and has no relationship to the choice of ISR/Strike basing alternatives or the impacts associated with the proposed action and alternatives. The aircraft and personnel required for the proposed ISR/Strike at Andersen AFB would, for the most part, rotate from various bases in the continental U.S. on a temporary basis, and the specific "source" bases may change from time to time. Aircraft that would make up the ISR/Strike capability were individually based at their home stations under separate NEPA analyses and decision-making processes.

unforeseen during preparation of this EIS. The Air Force will prepare later supplements or analyses “tiered” from this document at the appropriate times to address subsequent actions or new information.

This EIS identifies, describes, and evaluates potential environmental impacts that may result from the proposed establishment of an ISR/Strike capability at Andersen AFB, the No Action Alternative, and possible cumulative impacts from other past, present, and reasonably foreseeable future actions planned for the Base and any other agency (federal or non-federal) or person. This EIS also identifies required environmental permits and consultations relevant to establishment of the ISR/Strike capability. As appropriate, the affected environment and environmental consequences of the proposed action and No Action Alternative may be described in site-specific (*e.g.*, biological resources) or regional (*e.g.*, air quality) terms. Finally, the EIS identifies possible mitigation measures to prevent or minimize environmental impacts.

Draft EIS Comment: Discussion of the “no action” alternative.....fails to assess continued operation of the units at their current installations.

Response: The No Action Alternative does not require the analysis of “continued operations” at the home stations of ISR/Strike aircraft. Should the ISR/Strike proposal not move forward, the aircraft that a part of the ISR/Strike capability would continue to operate under previously completed NEPA analyses and related Air Force decisions.

The following environmental resources are assessed in the EIS: noise; land use; air quality; infrastructure and utilities (to include water, wastewater, storm water, energy, solid waste, and transportation); biological resources; cultural resources; earth resources; groundwater resources; hazardous materials and waste; socioeconomic resources; airfield operations (to include aircraft safety and bird/wildlife-aircraft strike hazard [BASH]); and environmental justice. Coastal zone consistency is addressed under special regulatory guidelines and environmental review procedures. This EIS assesses both the impacts that could occur during establishment of the ISR/Strike capability and from recurring activities after the ISR/Strike capability establishment is complete.

The ISR/Strike operational capability would be established in four phases and the number of aircraft and people would increase over an approximate 16-year period. The potential for impacts would be less during the early phases of ISR/Strike capability implementation than in the later phases or after full establishment when recurring activities occur. The full ISR/Strike capability recurring condition represents the most environmentally extreme

Draft EIS Comment: Though mentioned briefly (pg 1-3) the relocation of 8,000 Marines from Japan to Guam emphasizes the need to reevaluate the cumulative effects of all projects in the foreseeable future.

Therefore, we recommend that the Air Force wait to finalize the Draft EIS until this information is available so that the cumulative impacts can be adequately addressed.

The amount of area to be affected by all actions could increase significantly further impeding the recovery of T&E species.

Response: The Air Force has declined to wait two years to modify the analysis in the EIS as suggested by the commenter because Subchapter 1.2.1 already describes the unavailability of the information needed to assess the cumulative impacts of the other action identified in the comment. The Air Force would be required to fully evaluate the cumulative effects (or impacts) of related proposed actions, *e.g.*, Marines moving to Guam from Japan, that can be meaningfully evaluated. However, any plans the Marines may have to move from Japan to Guam have not been settled and are still under development. Additional planning and programming is needed regarding the relocation of Marines to Guam, and it will be about two years before the environmental assessment for the relocation of the Marines is complete. Consequently, the Air Force would expect the Marine Corps to capture the cumulative impacts (or effects) of their proposed actions along with this proposed action in their separate environmental assessment when their actions are fully vetted and known. The Air Force recognizes there has been speculation in the press regarding the potential Marine Corps move to Guam. However, Air Force and Marine Corps discussions have indicated that these stories are only speculation and nothing has been finalized.

condition that could occur during and after ISR/Strike implementation. Therefore, analysis for environmental resources is based on the level of activities that would occur from the recurring operations beginning after the ISR/Strike capability is fully established.

1.2.1 Past, Present, and Reasonably Foreseeable Future Actions

The Air Force is aware of the potential moves of non-Air Force DoD units to Guam and the 2005 BRAC-directed realignment that affect DoD units on Guam. The proponent(s) for these actions will address them in separate NEPA documents, as appropriate, when sufficient details for an environmental analysis become available. The non-Air Force DoD units will be able to address their projects in NEPA documents that cumulatively look at all DoD projects planned for Guam, to include Air Force projects. At this time, the specific information on the proposed non-Air Force DoD moves such as the number(s) of personnel, the location(s) of the basing actions, the number(s) and type(s) of facilities that would be constructed, the timing and financing of the projects, and the type and location of training activities associated with these proposals has not been detailed. Thus, it is not possible to analyze the cumulative impacts of the ISR/Strike proposal with the aforementioned proposed non-Air Force future actions.

The Air Force contacted the two Navy installations on Guam and Government of Guam (GovGuam) for details concerning their upcoming actions that should be considered for cumulative impact purposes. No actions were identified by the two Navy installations (Cruz 2005b) or GovGuam. However, a Notice of Intent to prepare an EIS was published July 29, 2005 for the Navy's Wharf Expansion project. This project, when added to other past, present, and reasonably foreseeable future actions, has no expected cumulative impact on this proposed action.

The 2005 BRAC-directed joint-basing operation at Andersen AFB determined that the Navy will be the lead DoD Service in command of military operations for all Services stationed on the Island of Guam, including military family housing. As a result, a joint Navy-Air Force Housing Requirements and Market Analysis for almost the entire island is being accomplished and the results are not expected until early 2007. The joint-analysis will determine military family housing requirements for the Air Force, Navy, and Marine Corps, and will take into account any mission change for the Navy, Air Force, and Marine Corps. The military family housing analysis will also consider whether the housing program is better managed by the DoD or under a privatization contractor. NEPA analysis will be accomplished for the military family housing initiative when sufficient information is available after the analysis is complete and the DoD management/privatized housing management decision is made. The Air Force currently estimates approximately 190 additional military family housing units would be necessary to support the ISR/Strike capability. Thus, construction and occupancy of an additional 190 military family housing units are assessed in this EIS.

1.2.2 Aircrew Training

Bomber and fighter aircrews associated with ISR/Strike would have a requirement to accomplish weapons delivery training, and fighter aircrews would have a requirement for training such as air-to-air combat. Tanker and Global Hawk aircrews do not have training events that require ranges or special use airspace. Takeoff and landing training for fighter, bomber, tanker, and Global Hawk aircrews associated with the proposed action in this EIS would be

accomplished in the airspace allocated to the Andersen AFB air traffic control tower. Weapons delivery training is accomplished on a range and air-to-air combat training is accomplished in special use airspace (e.g., military operations area [MOA], restricted area, air traffic control assigned airspace [ATCAA], or warning area) established for military training. Thus, the Air Force should have access to a range and special use airspace at which those ISR/Strike fighter and bomber aircrews could accomplish training while deployed.

Farallon de Medinilla Range

The Navy is responsible for and operates the FDM Range and the associated Northern Marianas Range Complex. Farallon de Medinilla, an uninhabited island about 150 miles north of Guam, is owned by the Commonwealth of the Northern Mariana Islands (CNMI) and is leased by the Navy. The advantages of FDM are its ability to support live weapons training, and its

Draft EIS Comment: The DEIS fails to satisfy NEPA's mandate to take a hard look at the environmental consequences of the Air Force's proposed course of action. Initially, it contains no analysis whatsoever of potential impacts associated with "training range and airspace utilization" by the scores of fighters and bombers the Air Force proposes to deploy to Andersen, despite the Air Force's concession that they "may ultimately be relevant to significant adverse environmental impacts."

Response: The Air Force recognizes its responsibility to analyze the impacts of future impacts associated with its decision making relative to training range utilization. The Air Force is deferring its decisions on potential range utilization issues to a future decision point when those matters will be "ripe" for decision. Those future training decisions will be based on a Navy EIS (of which the Air Force is a cooperating agency) that will fully evaluate military training operations in the Mariana Islands.

The Navy will be revising the Range Complex Master Plan for all ranges within the Marianas Islands under the Tactical Training Theater Assessment and Planning Program Associated with the Master Plan revision. The Navy will prepare a Marianas Islands Range Complex EIS, which is anticipated to be available during approximately Phase 0 of the ISR/Strike operational capability with completion estimated to be in July 2009. That EIS will assist in defining how the Air Force's ISR Strike aircraft will train after rotations from home units begin.

It is worth reiterating that ISR Strike aircraft personnel will receive the majority of their required training before departing their home station. Although there will be some training associated with the ISR Strike aircraft, training is a secondary issue to the operational prerogatives established in various Department of Defense and Air Force strategic plans for ISR Strike basing on Guam

The Air Force has clarified its intent with respect to range utilization in its discussion of Aircrew Training in Section 1.2.2 and other related sections of the FEIS.

remoteness insulates it from sea and air traffic encroachments permitting conduct of high value tactical strike training. The Navy's COMNAVMARIANAS organization, which is located on Guam, is the controlling and scheduling authority for Navy-owned and controlled training areas in the Mariana Islands. COMNAVMARIANAS schedules the training at the bombing range on FDM and within the restricted airspace (R-7201) associated with the range. The Navy maintains the bombing range on FDM in accordance with environmental agreements with the CNMI. This 206-acre range complex is currently used by the Air Force for air-to-ground weapons and air-to-air training.

Military training activities at the Range Complex were environmentally assessed under NEPA in the Marianas Training EIS (USPACOM 1999). The Biological Opinion (BO) and Conference Report, Military Training in the Marianas on January 4, 1999, defers to the BO issued April 6, 1998. In the BO, the United States Fish and Wildlife Service (USFWS) accepted the Navy's projected incidental take of no more than one nest of green sea turtles per nesting season, one megapode per year, and one Mariana fruit bat per year as a result of the ordnance delivery on FDM. The USFWS concurred with the Navy's determination that the level of anticipated take is

not likely to result in jeopardy to the green sea turtle, hawksbill sea turtle, Micronesian megapode, Mariana fruit bat, and Tinian monarch, or destruction or adverse modification of critical habitat.

For mitigation, the Navy agreed to restrict its impact zone to the central interior portion and/or southern tip of the island and western cliff faces to the maximum extent possible. In addition, the Navy agreed to prohibit the use of cluster bombs in training on FDM. The DoD agreed to report the taking within one month if the take of megapodes and Mariana fruit bats occurred as a result of their training activities. Present and proposed use of FDM would continue to follow these mitigation measures.

The Marianas Training EIS assessed Air Force activity that included sorties for rotational bombers at Andersen AFB on which a total of 7,344 live and inert bombs would be delivered annually. Between 5 and 612 live and inert weapons could be dropped each month, with lower numbers being more typical. Air Force bomber aircraft may conduct high-, medium-, and low-altitude bombing runs dropping conventional 500-, 750-, and 2,000-pound bombs; precision-guided munitions, and mines (USPACOM 1999). Approximately 45 percent of the FDM range sorties by bomber aircraft drop inert bombs only. In the 1998 BO, the training tempo and ordnance delivery included Air Force bombers flying up to 160 days per year, with up to two range sorties per day (320 annual sorties). According to the 2003 Target and Range Information Management System (TRIMS) data, the 23 Air Force sorties comprise about 4 percent of the total 516 annual sorties at FDM (TRIMS 2004).

The types of weapons that would be released from the aircraft and the methods of delivery associated with the Andersen AFB rotational ISR/Strike bombers would be identical to that assessed for bomber aircraft in the Marianas Training EIS. The Air Force does not expect ISR/Strike bomber training to exceed the bomber training threshold (*i.e.*, release of 7,344 live and inert bombs) assessed in the Marianas Training EIS.

The Marianas Training EIS also assessed air-to-surface gunnery by Navy and Marine Corps fighter/attack aircraft (*e.g.*, F/A-18) practicing routine interdiction, strike, and close air support missions. These aircraft deliver bombs (mostly 500-pound bombs) from all altitudes and air-to-ground missiles to the southern end of the island. The Marianas Training EIS assessed an annual ordnance delivery of 4,940 weapons from Navy and Marine Corps aircraft to include about 80 missiles, 840 rockets, and 4,020 bombs (1,400 small [250 to 500 pounds], 1,240 large [1,000 to 2,000 pounds], and 1,380 inert bombs) (USPACOM 1999).

The ISR/Strike F-22 and F-15E aircraft would deploy munitions very similar to those delivered by Navy F/A-18s, which are assessed in the Marianas Training EIS. Additionally, the operating characteristics (*i.e.*, airspeed and methods of ordnance delivery) of all three aircraft are very similar. Thus, the F-22s and F-15Es could be interchanged with the F/A-18s when considering the types of activities that were assessed for fighters in the Marianas Training EIS. Navy records for FY03 indicate that about 1,563 weapons were dropped on FDM by Navy, Marine Corps, and Air Force fighter aircraft. When subtracting the 1,563 weapons that were dropped in FY03 from the 4,940 that were assessed in the Marianas Training EIS, 3,337 weapons could be dropped annually by other FDM users such as the ISR/Strike fighters provided the actual FY03 data are representative for a typical year. The combined number of weapons that would be dropped annually on FDM by all users (*i.e.*, Navy, Marine Corps, and Air Force) would not exceed the threshold of 4,940 bombs that was assessed in the Marianas Training EIS. Additionally, operations by ISR/Strike aircraft would comply with the previously mentioned mitigation restrictions associated with operations at FDM.

The Navy will be revising the Range Complex Master Plan for all ranges within the Mariana Islands under the Tactical Training Theater Assessment and Planning Program. The Navy will prepare the Mariana Islands Range Complex EIS in conjunction with the Master Plan process. The EIS is anticipated to be completed in July 2009, which coincides with Phase 0 of the ISR/Strike operational capability (see Subchapter 2.2). The Navy would evaluate training by the Navy, Marine Corps, and Air Force for all the Mariana Islands military training areas to include Air Force bomber and fighter training at the Navy-managed FDM range. The Navy will include ISR/Strike training as part of the proposed action in the Mariana Islands Range Complex EIS. The capability of FDM to support operations post-ISR Strike beddown will be ripe for evaluation in the Mariana Islands Range Complex EIS. Analysis of the proposed ISR/Strike training operations at FDM is not possible at this time because the training requirements have not been finalized. The Air Force sent a letter to the Navy requesting that the Air Force be a cooperating agency for preparation of the Mariana Islands Range Complex EIS (see Appendix A). In this capacity, the Air Force will participate in the scoping process, develop information and prepare analyses for which it has special expertise, and provide staff for interdisciplinary reviews.

1.2.3 Interagency and Intergovernmental Coordination for Environmental Planning and Public Participation

Interagency and Intergovernmental Coordination for Environmental Planning

Air Force Instruction (AFI) 32-7060, *Interagency and Intergovernmental Coordination for Environmental Planning*, provides the procedures to comply with applicable federal, state, and local directives for Interagency and Intergovernmental Coordination for Environmental Planning (IICEP). The Air Force notified federal and GovGuam agencies of the proposed action under IICEP guidance. Appendix A contains the IICEP documentation for the proposed action.

The Air Force distributed the Draft EIS to federal and GovGuam agencies for review. Appendix B contains the transmittal letter and comments from review of the Draft EIS. Seven agencies provided comments on the Draft EIS.

Public Participation

The *Air Force Environmental Impact Analysis Process* (32 CFR 989) sets forth the public involvement process for the EIAP. Public involvement is accomplished to allow citizens and interested parties the opportunity to participate in the EIAP. The Air Force published a notice of intent (NOI) to prepare an EIS for the establishment of the ISR/Strike capability in the *Federal Register* on May 18, 2005. (The NOI reflected preparation of an EIS for the Global Strike Task Force. The scope of the document and title were changed, respectively, to an EIS and ISR/Strike capability after the public scoping meeting to more accurately describe the mission associated with the proposed action.) Newspaper ads announcing the public scoping meeting conducted on June 9, 2005 were published in the *Pacific Daily News* on May 21 and June 5, 6, and 8, 2005. Appendix B contains copies of public participation documentation, including responses from interested organizations and individuals. Table 1.2-1 lists the resource areas identified by agencies and the public as a result of the IICEP and scoping processes.

Table 1.2-1 Summary of Environmental Comments by Resource Area from Scoping

Resource Area
Noise
Concern for disturbance to T&E Species
Land Use
Surrounding Land Use
Military Family Housing
Infrastructure and Utilities
Availability of Infrastructure and Utilities to Surrounding Landowners
Biological Resources
Public Hunting Program
Threatened and Endangered Species Recovery (Flora and Fauna)
Brown Tree Snake Control and Interdiction
Recommendation for Vegetation Survey
Recommendation for Analysis of Cumulative Impacts on Habitat Fragmentation
Concern for Air Force Commitment to Goals of Integrated Natural Resources Management Plan
Cultural Resources
Plan for Handling Cultural Resources found During Construction
Groundwater Resources
Water Supply
Water Quality
Socioeconomic Resources
Economics of Constructing Housing to Accommodate Increase in Military Families

The Air Force published a notice that the Draft EIS was available for review in the *Federal Register* on May 12, 2006. Newspaper ads announcing the availability of the Draft EIS for review and the public hearing that was held on June 1, 2006 were published in the *Pacific Daily News* on May 12, 14, and 30, 2006. Appendix B contains copies of public hearing documentation, including responses from interested organizations and individuals, and the list to which copies of the Draft EISs were mailed. Additionally, the electronic file of the Draft EIS was available on an internet web site that was publicized in the advertisements in the *Pacific Daily News*. Copies of the Draft EIS also were available to the public at the Nieves Flores Memorial Library, Hagatna, Guam. The public also had the opportunity to obtain additional information or to request copies of the Draft EIS by contacting Mr. Jonathan Wald, Chief, Conservation Resources, Unit 14007, APO, AP 96543-4007. Appendix B contains comments from the three organizations and three individuals that provided comments on the Draft EIS.

The ISR/Strike Draft EIS Public Hearing was from 4:00 p.m. to 7:00 p.m. on June 1, 2006 in the Hilton Guam in Hagatna, Guam. A total of 39 persons attended the public hearing: 13 agency representatives, three elected officials from the Guam Legislature, three from organizations, eight community members, and 12 Air Force and associated contractors (see Table 1.2-2).

Table 1.2-2 Summary of Public Hearing Attendance

Type	Description		Number of Attendees	Subtotal
Government Agencies	Federal	Federal Aviation Administration	1	3
		United States Fish and Wildlife Service	1	
		Navy	1	
	GovGuam	GDAWR/Agriculture	6	10
		Guam Environmental Protection Agency	1	
		Port Authority	1	
		Bureau of Statistics and Planning/Coastal Resources Management Program	2	
Guam Legislature		3	3	
Organizations	Chammoro Cultural Development and Research Institute		1	3
	Intergraph		2	
Community Members			8	8
Air Force and Contractor			12	12
Total				39

The public hearing presented project information and provided attendees the opportunity to provide both oral and written comments. The following summarizes the comments by the three individuals who chose to provide oral comments.

- Concern for the safety of the people of Guam with regards to military buildup on Guam and that his family was not duly compensated for land condemnation by the U.S. Government in the acquisition of Andersen AFB lands.
- Comments in favor of the project and appreciation for reuse of developed land on Andersen AFB for the project to the maximum extent possible.
- Comments regarding preservation of cultural resources.

Two written comment sheets were received at the public hearing. One commenter indicated support for the project and the other comment suggested that construction projects be monitored for cultural resources.

A total of 18 agencies, organizations, and individuals provided comments at the public hearing and from review of the Draft EIS. Table 1.2-3 summarizes the comments received on the Draft EIS. Each comment was reviewed and considered and the Air Force prepared responses (Appendix B). Text boxes throughout this EIS contain selected comments submitted on the Draft EIS and the response to the respective comment. The comments from agencies, organizations, and individuals also provided input for changes and clarification of this Final EIS.

**Table 1.2-3 Summary of Environmental Comments by Resource Area
from the Public Hearing and Review of the Draft Environmental Impact Statement**

Resource Area
Noise
Noise mitigation for schools
Aircraft noise from Alternative B
Land Use
Changes to the Air Installation Compatible Use Zone program
Infrastructure and Utilities
Ensure that wastewater disposal systems and storm water control comply with Guam Environmental Protection Agency regulations
Landfill issues
Wastewater treatment
Biological Resources
Loss of habitat due to clearing activities and human disturbance
Effect of noise on T&E species
Equipping the Wildlife Management Specialist to implement functions listed in conservation measures
Ungulate eradication and control
Interdiction of BTS on departing aircraft and cargo and BTS control
Commitment to conservation measures
Location at which family housing units would be constructed
Identification of organisms of concern as foreign invaders
Cultural Resources
Archaeological and historic resources
Groundwater Resources
Protection of the aquifer
Hazardous Materials and Wastes
Ensure project does not delay clean up of contaminated sites
Socioeconomic Resources
Socioeconomic resources, to include housing costs
Resource Area
Cumulative Impacts
Cumulative impacts from past, present, and reasonably foreseeable future actions
Regulatory Requirements
Adequacy of environmental impact analysis relative to NEPA, CEQ regulations, and Air Force environmental impact analysis process guidance
Impact analysis for the airspace and range that would be used for aircrew training

1.2.4 Clarifications and Changes in the Final Environmental Impact Statement

The Final EIS is a revision of the Draft EIS. The clarifications and enhancements in this Final EIS are based on changes resulting from comments on the Draft EIS from agencies, organizations, and individuals (see Appendix B). Other changes are based on modifications to

the details associated with the proposed action and updates to other information (*e.g.*, a traffic study accomplished in June 2006).

- Subchapter 1.2.2 was revised concerning the fighter aircrew training in the FDM Range Complex.
- Implementation of the ISR/Strike capability as assessed in the Draft EIS would begin in FY07, with full ISR/Strike operations recurring after FY19 instead of FY16. Construction activities would still begin in FY07; however, the construction period would be 16 years instead of 8 years.
- The first phase of the ISR/Strike establishment in the Draft EIS was identified as “Initial Operating Capability” and the first phase in this Final EIS is now referred to as “Phase 0;” however, there are still four implementation phases. Although there is no difference between the year in which the ISR/Strike establishment would begin (*i.e.*, FY07), the years in which the phases would begin and end differ due to the extension of the implementation schedule.
- The selection standards (see Subchapter 2.1.1.1) were revised to better summarize the selection standards for alternatives process.
- The discussion related to the application of selection standards to location alternatives (see Subchapter 2.1.3.1) were expanded to better explain how Andersen AFB is the installation best suited to host the ISR/Strike capability.
- There are no differences between the Draft and Final EISs regarding the numbers of personnel or aircraft associated with each of the four phases. Aircraft and personnel would arrive at Andersen AFB sometime in Phase 0 (*i.e.* FY07-10).
- A figure was added that graphically compares the aircraft noise exposure for Alternatives A and B.
- The location of the combat arms training and management facility location was added to Figure 2.4-2.
- Subchapter 2.4.3 was revised to state that the Transportable Airlift Control Element and Logistics unit training would be accomplished within existing facilities.
- The conservation measure in Subchapter 2.2.1.2 concerning ungulate exclosure fencing was expanded by adding the factors that were considered when developing the fence lines for the exclosure.
- Subchapter 3.2 was revised to better explain how the Air Installation Compatible Use Zone (AICUZ) program works.
- Subchapters 2.2.1.1 and 4.1.1.1 were expanded to state that all new on-Base residential and public use buildings would be designed and constructed to comply with noise level reduction standards.
- The adaptive management conservation measure in Subchapter 2.2.1.2 was expanded to include information on an adaptive management working group.
- Text was added to Subchapter 2.2.1 explaining how flying operations are scheduled.
- The annual air emissions from construction were recalculated based on a 16-year period.

- The mitigation for socioeconomic resources related temporary housing quarters (construction camp) for imported contract laborers was eliminated. However, the concept for housing these individuals was changed from establishing a camp in an area in which there is no infrastructure or utilities to a site that could use existing utility systems that have verifiable existing utility capacities.
- The number of fighter, tanker, and bomber aircraft could be as many as 48, 12, and 6 aircraft, respectively, instead of a definite 48, 12, and 6 aircraft. The number of Global Hawks is the same in the Draft and Final EISs.
- The Section 7 consultation under the Endangered Species Act (ESA) was completed and the Final EIS refers to the USFWS BO resulting from that process.
- Table 4.5-4, which reflected direct habitat loss, was updated to reflect direct and indirect habitat loss as determined by the USFWS in the BO. Analysis in Subchapter 4.5.1.3 was revised to align with the revision of Table 4.5-4.
- Subchapter 4.5.1.2 was expanded to state that Andersen AFB would use Armed Forces Pest Management Board guidance for reducing feral/stray cat populations.
- Subchapter 4.5.1.4, which summarizes the Incidental Take Statement from the BO, was added.
- Text was added to Subchapter 4.5.4, Biological Resources Mitigation, referring to the terms and conditions of the BO which is in Appendix E.
- The Section 106 consultation under the *National Historic Preservation Act* of 1966 was completed and the Final EIS reflects the Guam State Historic Preservation Officer (GSHPO) concurrence with ISR/Strike project.
- GovGuam, Bureau of Statistics and Plans concurred that the ISR/Strike is consistent with the Guam Coastal Management Program (GCMP) and the Final EIS reflects this consultation process.
- The 190 family housing units proposed under the ISR/Strike project would be constructed in a previously disturbed unforested area of the base. Additionally, Subchapters 2.2.1.1 and 4.10.1.2 were expanded to state that the housing units and dormitories would be constructed on a phased schedule that mirrors increases in the number of personnel.
- Information on the distribution of bird/wildlife-aircraft strikes by altitudes at airports was added to Subchapter 3.11.3.
- The traffic analysis for the intersection of Arc Light Boulevard and Highway 1 and Route 9 and the proposed intersection of the new Commercial Gate and Route 9 was revised based on data from a June 2006 traffic study.
- Analysis in Subchapter 4.4.1.1 was expanded to state that facilities that would be constructed would have low-flow water saving devices.
- The landfill analysis was revised to reflect the three options the Air Force could use for the long-term. Additionally, text was added to state that Andersen AFB would submit a permit application and coordinate the landfill project with GovGuam.

- Wastewater analysis was revised concerning pre-treatment prior to entry into the sewer system. Additionally, text was added to Subchapter 3.4.2 summarizing current Base wastewater management practices.
- Text was added to state that the Air Force would meet the goals of the executive order for *Greening the Government through Efficient Energy Management* and the memorandum of understanding concerning *Federal Leadership in High Performance and Sustainable Buildings*.
- The hazardous waste analysis was expanded by quantifying the amount of hazardous waste.
- The analysis for school enrollment was revised.
- The Air Force will be a cooperating agency in the preparation of COMPACFLT's Mariana Islands Range Complex EIS.

1.2.5 Applicable Regulatory and Permit Requirements

To comply with NEPA, the planning and decision-making process for actions proposed by federal agencies involves a study of other relevant environmental statutes and regulations and permit requirements. The NEPA process, however, does not replace procedural or substantive requirements of other environmental statutes and regulations. It addresses them collectively in the form of an environmental assessment or EIS, which enables the decision-maker to have a comprehensive view of major environmental issues and requirements associated with the proposed action. According to CEQ regulations, the requirements of NEPA must be integrated “with other planning and environmental review procedures required by law or by agency so that all such procedures run concurrently rather than consecutively.”

Clean Water Act

The *Clean Water Act of 1977* and the *Water Quality Act of 1987* (33 U.S. Code [USC] 1251, *et seq.*, as amended) established federal policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters and, where attainable, to achieve a level of water quality that provides for the protection of fish, shellfish, wildlife, and recreation in and on the water.

Numerous construction projects would be accomplished to establish the ISR/Strike capability. Construction contractors would prepare and implement an Environmental Protection Plan (EPP). The contractor would provide the EPP to Andersen AFB for submittal to Guam Environmental Protection Agency (Guam EPA).

New facilities that have washracks would have oil/water separators designed into wastewater disposal systems.

Plan review for expansion of drinking water systems would be required by the Guam EPA. The water distribution systems, including water storage tanks and water line connections must be inspected for compliance to meet Guam and U.S. Safe Drinking Water Standards.

Biological Resources

The Endangered Species Act (16 USC 1531, *et seq.*) requires federal agencies that fund, authorize, or implement actions to avoid jeopardizing the continued existence of federally listed

threatened or endangered species, or destroying or adversely affecting their critical habitat. Federal agencies must evaluate the effects of their actions through a set of defined procedures, which can include preparation of a biological assessment and formal consultation with the USFWS.

The Air Force initiated coordination with the USFWS under Section 7 of the ESA on March 22, 2005 by requesting consultation and conference with the USFWS. The USFWS's June 30, 2005 response to the May 18, 2005 notice in the Federal Register identified the endangered plant *Serianthes nelsonii* and endangered Mariana crow and threatened Mariana fruit bat as occurring on Andersen AFB. The response also noted that the Base contains habitat identified as essential to the recovery of the endangered Guam Micronesian kingfisher, endangered Guam rail, Mariana crow, and Mariana fruit bat. The response also noted concern with brown tree snake (BTS) (*Boiga irregularis*) control and interdiction. The USFWS also recommended that the Air Force include a vegetation survey of the areas that may be affected by the proposed action. The Air Force provided results of the vegetation survey to the USFWS on August 25, 2005 as an attachment to a letter that also requested informal consultation. A biological assessment (BA) was prepared and submitted to the USFWS on March 22, 2006 in support of formal consultation under the ESA. (Appendix E contains copies of the correspondence mentioned in this paragraph and the BA, which was supplemented in June 2006 in response to USFWS' request for additional information.) The formal consultation period began May 22, 2006. The Air Force and USFWS met to discuss the project and associated issues on August 1, 2006. The USFWS prepared a BO on October 3, 2006 in response to the BA (USFWS 2006) (see Appendix E).

Each plant species is initially referred to by its full scientific name, and thereafter by its genus name in the text of this EIS. For the few genera with more than one species present, the full scientific name is used throughout. Throughout the text, animal species are referred to by the English common name. Additionally, area and distance for biological resources are presented in the metric system, while area and distance for other resources are presented in the English system.

Cultural Resources

The *National Historic Preservation Act* of 1966, as amended (NHPA) (16 USC 470, *et seq.*) provides the principal authority used to protect historic resources, establishes the National Register of Historic Places (NRHP), and defines in Section 106, the requirements for federal agencies to consider the effects of an action on properties on or eligible for inclusion on the NRHP. *Protection of Historic and Cultural Properties* (36 CFR Part 800 [1986]) provides an explicit set of procedures for federal agencies to meet their obligation under the NHPA, including inventorying of resources and consultation with state historic preservation offices. *The Archaeological Resources Protection Act of 1979* (16 USC 470, *et seq.*) ensures that federal agencies protect and preserve archaeological resources on federal or Native American lands, and establishes a permitting system to allow legitimate scientific study of such resources.

In compliance with Section 106 of the NHPA and Protection of Historic and Cultural Properties, the Air Force initiated coordination with the GSHPO in a letter received by the GSHPO on March 23, 2005. The Air Force sent an additional request for a consultation letter to the GSHPO on July 26, 2005. The letter also stated that the Air Force will conduct an

archaeological review for the area of potential effect (APE); a work plan and research design will be submitted if any additional field work is required; and the Air Force will submit a letter of concurrence/non-concurrence based on the finding of the archaeological review. In a September 14, 2005 letter, the GSHPO mentioned that most of Andersen AFB main base has been developed and little archaeological sites are expected. The letter did state there are some buildings/structures that have been evaluated as “significant” under the NRHP criteria and that the Air Force buildings/structures that would be demolished are not historically significant. The GSHPO provided comments to the research design for the cultural resources inventory survey in an April 14, 2006 letter. A May 8, 2006 from the GSHPO to Andersen AFB stated that the final research design sufficiently addressed comments identified in the April 14, 2006 letter. (Appendix D contains copies of the correspondence mentioned in this paragraph.)

Draft EIS Comment: ...the document does not show the locations of sites from archaeological surveys conducted on the base over the past years, or discuss possible impacts due to their proximity to the proposed actions.

Response: FEIS was improved and modified by updating Subchapters 1.2.5 and 4.9.1 of the FEIS to reflect the completion of a cultural resources survey and are part of the survey, as well as the concurrence from the GSHPO that no further archaeological work will be necessary.

The Air Force, with the assistance from the GSHPO, accomplished a Section 106 review process that included a survey to identify and record significant historical, architectural and archaeological sites in the ISR/Strike area. An Executive Summary for Cultural Resources Inventory, which contains the findings of the survey and management recommendations, was forwarded to the GSHPO on September 6, 2006. (Appendix D contains the Executive Summary.) Based on review of the Executive Summary, the GSHPO responded in an October 3, 2006 letter (see Appendix D) that “further archaeological investigation on prehistoric sites at ISR/Strike will not provide any new information about the project area, but such an investigation will only be redundant to what we already know about the project.”

Environmental Justice

In Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, the President instructed each federal agency to make “...achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.”

Coastal Zone Management

Federal Activity in or affecting a coastal zone requires preparation of a Coastal Zone Management Consistency Determination in accordance with the federal *Coastal Zone Management Act* (CZMA) of 1972 (Public Law [PL] 92-583, as amended (PL 94-370)). The CZMA was passed to preserve, protect, develop and, where possible, restore or enhance the nation’s natural coastal zone resources. Administration of the CZMA for Guam has been delegated to GovGuam, Bureau of Statistics and Plans (BSP).

The GCMP is an expression of Guam policy to guide the use, protection, and development of land and ocean resources within the Guam costal zone. The “coastal zone” of Guam includes all non-federal property on the island, including offshore islands and submerged lands and waters extending seaward to a distance of 3 nautical miles. While federal lands are excluded from the coastal zone, federal agency activities, regardless of location, must be consistent with the GCMP

to the maximum extent practicable per Coastal Zone Act Reauthorization Amendments (PL 101-508), 15 CFR Part 930.

Andersen AFB submitted a Coastal Zone Management Assessment form to the BSP, the lead agency for the GCMP, for the federal agency consistency review on August 30, 2006. The BSP, in a September 22, 2006 letter, concurred that the ISR/Strike project will be undertaken in a manner consistent with the objectives and enforceable policies of the GCMP to the maximum extent practicable and in accordance with PLs 92-583 and 94-370. Appendix A contains the Coastal Zone Management Assessment form and the BSP response letter.

Air Quality

The *Clean Air Act* (CAA) (42 USC 7401-7671g) establishes federal policy to protect and enhance the quality of the nation's air resources to protect human health and the environment. The CAA requires that adequate steps be implemented to control the release of air pollutants and prevent significant deterioration in air quality. The 1990 amendments to the CAA require federal agencies to determine the proposed actions with respect to state implementation plans for attainment of air quality goals.

Title V of the CAA amendments of 1990 requires most large source emitters and some smaller sources to obtain a permit called a Title V operating permit. An operating permit is a legally enforceable document that permitting authorities issue to air pollution sources after the source has begun to operate. Most Title V permits are issued by state and local permitting authorities. The purpose of Title V permits is to reduce violations of air pollution laws and improve enforcement of those laws.

Under 40 CFR Part 69, Guam has a conditional exemption from implementing the Title V operating permit program and, except for major sources of hazardous air pollutants (HAP), Title V operating permit applications are not required for major sources on Guam. Major sources other than major HAP sources, are subject to Guam's alternate permit regulations. The United States Environmental Protection Agency (USEPA) recently issued a final rule, promulgated at 71 *Federal Register* 9716 (February 27, 2006), approving Guam's alternate permitting regulations in lieu of a Title V operating permit program.

Guam EPA encourages all new proposed dwellings, dormitory, classrooms, and offices on Andersen AFB be designed as Radon Resistant New Construction Buildings because these facilities would be constructed over limestone topography known to emit unsafe levels of radon gas.

Noise

Land Use guidelines established by the United States Department of Housing and Urban Development (HUD) and findings of the Federal Interagency Committee on Noise (FICON) recommend acceptable levels of noise exposure for land use.

Land Use

Air Force Instruction 32 7063, *Air Installation Compatible Use Zone (AICUZ) Program*, provides guidance to air bases and local communities in planning land uses compatible with airfield operations. The AICUZ program describes existing aircraft noise and flight safety zones on and near Air Force installations with a flying mission.

Aircraft Safety and Bird/Wildlife Aircraft Strike Hazard

Air Force Instruction 91-202, *The U.S. Air Force Mishap Prevention Program*, establishes mishap prevention program requirements (including the BASH program), assigns responsibilities for program elements, and contains program management information.

Hazardous Materials and Waste

Hazardous materials are those substances defined by the United States Department of Transportation (USDOT) (49 CFR 105.5). The Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (42 USC 6901, *et seq.*), further amended by the Hazardous and Solid Waste Amendments of 1984, defines hazardous waste. In general, both hazardous materials and hazardous waste include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may present substantial danger to public health or welfare or to the environment when released or otherwise improperly managed. The *Resource Conservation and Recovery Act* Subtitle C (40 CFR Parts 260 through 270 and 280) regulations are administered by the USEPA and are applicable to management of hazardous waste. Hazardous waste must be handled, stored, transported, disposed, or recycled in accordance with those regulations.

Clearing and Grading

The proposed activities involving clearing and grading would require Guam EPA permits, including Agency permit fees where applicable. An EPP would be required for clearing and grading activities. Storm water best management practices and erosion control measures would be implemented for construction and post-construction phases. Vegetative waste should be composted, mulched, and diverted from the waste stream going to the landfill. Prior to commencement of earthmoving activities, local government clearances from the Department of Agriculture, Department of Parks and Recreation, and the GSHPO must also be obtained.

Storm Water Management

The Guam EPA requires that all storm water, up to the 20-year, 24-hour storm event, be addressed on site of the proposed facilities. Permits for and upgrades to storm water management systems would be required to accommodate the large expected increases to the flows and decreases to quality of storm water. New expansion construction and upgrades to air strips, parking areas, or other impervious surfaces should have management controls consistent with GovGuam's legally applied Stormwater Management practices.

Wetlands

Executive Order 11990, *Protection of Wetlands*, directs Federal agencies to avoid adverse impacts associated with the destruction or modification of wetlands and avoid direct or indirect support of development in wetlands when practicable alternative exists. Agencies are to minimize wetland loss/degradation and preserve/enhance beneficial values of wetlands. No wetlands areas were identified in a non-jurisdictional wetlands survey of Andersen AFB that was conducted in August 1995 (Andersen AFB 2003c). Therefore, wetlands are not assessed in this EIS.

Floodplains

Executive Order 11988, *Floodplain Management*, directs Federal agencies to prevent adverse impacts associated with the occupancy and modification of floodplains and with the direct or indirect support of floodplain development. Agencies are to reduce risk of flood loss, minimize impact of floods on human safety, health and welfare, and restore and preserve the natural beneficial values of floodplains. No floodplains have been identified on Andersen AFB (Andersen AFB 2005c); therefore, floodplains are not assessed in this EIS.

Farmland Protection

The Farmland Protection Policy Act (7 USC Section 4201) is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that—to the extent possible—federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland. Because all Andersen AFB land is held for national defense purposes under 7 USC Section 4208(b) and 7 CFR Part 658.3(b), the Base is exempt from the requirement to consider the adverse effect of federal programs on the protection of farmland and other requirements found in the Act. Therefore, farmland is not assessed in this EIS.

CHAPTER 2 ALTERNATIVES INCLUDING PROPOSED ACTION

The proposed action would establish an ISR/Strike operational capability in four phases over an approximate 16-year period at Andersen AFB, beginning in FY07. Construction would begin in FY07 and occur over an approximate 16-year period. The ISR/Strike capability would consist of fighter, aerial refueling, bomber, unmanned aerial vehicle aircraft, and support personnel. Numerous facilities would be constructed as part of the proposed action. Establishment of the ISR/Strike operational capability could be accomplished through one of the two action alternatives (Alternative A and Alternative B).

This chapter discusses the following: alternatives formulation and consideration; a description of the action alternatives analyzed in detail; a description of the No Action Alternative; past, present, and reasonably foreseeable future actions for Andersen AFB during the time period associated with establishment of the ISR/Strike capability; and identification of the preferred alternative.

2.1 ALTERNATIVES FORMULATION AND CONSIDERATION

The NEPA and its implementing regulations (CEQ regulations) require not only an analysis of the proposed action, but also of “all reasonable alternatives” to the proposed action, including a No Action Alternative. CEQ regulations allow for eliminating alternatives from detailed study and require an EIS to discuss the reasons that an alternative was eliminated. The Air Force EIAP (32 CFR Part 989) provides a process for determining “reasonable” alternatives (thus requiring analysis) and a process based on reasonable selection standards for eliminating from detailed analysis alternatives determined not to be “reasonable.”

“Reasonable” alternatives are those that meet the underlying purpose and need for the proposed action (see Subchapter 1.1) that would cause a reasonable person to inquire further before choosing a particular course of action. The Air Force also must consider reasonable alternatives raised during the scoping process or suggested by others, as well as combinations of alternatives. The Air Force need not analyze highly speculative alternatives, such as those requiring a major, unlikely change in law or governmental policy. If the Air Force identifies a large number of reasonable alternatives, it may limit alternatives selected for detailed environmental analysis to a reasonable number of examples covering the full spectrum of alternatives (32 CFR Part 989.8(b)).

The Air Force may expressly eliminate alternatives from detailed analysis based on reasonable selection standards (*e.g.*, operational, technical, or environmental standards suitable to a particular project). The Air Force may develop written selection standards to firmly establish what is a “reasonable” alternative for a particular project, but it must not so narrowly define these standards that it unnecessarily limits considerations to the proposal initially favored by proponents (32 CFR Part 989.8(c)).

2.1.1 Selection Standards for Alternatives

Two separate processes were accomplished as part of the action to establish an ISR/Strike capability in the Pacific area. The first process considered location, and the second process

considered whether or not the aircraft and personnel associated with the ISR/Strike capability should be permanently based or in a rotational status.

2.1.1.1 Selection Standards for Location Alternatives

A viable location for the ISR/Strike capability for the Pacific region, must:

- A. Be on U.S. territory to allow implementation of procedures for security protection of forces;
- B. Allow all elements of the ISR/Strike capability to be on one installation;
- C. Allow deployed aircraft to reach areas of conflict in East Asia and return to the same base in the required response time;
- D. Allow bomber aircraft to reach areas of conflict without additional airlift assets;
- E. Allow Global Hawk aircraft, which are not capable of being refueled in flight, to return to the installation at which they are based;
- F. Have adequate existing airfield infrastructure (*e.g.*, runways, aircraft parking, and associated airfield support systems) that would allow for additional aircraft operations without interfering with existing operations; and
- G. Have adequate base operating support or weapon storage areas that would allow for 30-day continuous airfield operations without constant logistical re-supply from air or sea.

2.1.1.2 Selection Standards for Aircraft and Personnel Status Alternatives

The two aircraft and personnel status alternatives, based or rotational, are described below.

Basing includes permanently placing aircraft and personnel at a location. Personnel authorizations are established at the location and facilities are provided to support the personnel and aircraft. Dependents may be authorized to accompany based personnel.

Under the rotational concept, aircraft and personnel temporarily relocate from the installation at which they are permanently based to the rotational location. The aircraft and personnel are at the rotational location on a temporary basis until they are replaced by the next group of rotational aircraft and personnel. The rotational location is not authorized support facilities at the same level as those for permanently based aircraft, nor does it receive an increase in personnel authorizations. Dependents are not authorized to accompany rotational personnel. These basing and rotational concepts apply throughout this EIS.

The decision concerning the status for aircraft and personnel at the ISR/Strike location should consider the degree to which the selected alternative:

- Meets the operational objective of the ISR/Strike capability (see Subchapter 1.1);
- Impacts the overall Air Force structure for fighter, tanker, bomber, and Global Hawk aircraft and personnel; and
- Impacts the Air Force's overall ability to support worldwide DoD operational requirements.

The objective of the ISR/Strike capability is to achieve pre-engagement battle space awareness, locate and identify critical adversary moves, achieve assured success through air

dominance, and deliver decisive effects via persistent and precise application of air and space power. The Air Force determined that the following four aircraft types and the numbers of each aircraft type are needed to meet the objective for the ISR/Strike capability: 48 fighter (F-22s and F-15Es); 12 tanker (KC-135s); six bomber (B-1s, B-2s, and B-52s); and four Global Hawk RQ-4 aircraft. Thus, the Air Force did not consider alternatives with varying numbers of each of the four aircraft types.

The 48 fighters, 12 tankers, six bombers, and four Global Hawks would be necessary to meet the objective for the action. These numbers of aircraft represent the capability needed to meet the extreme condition to which the Air Force might be required to respond. There could be times when the numbers of fighters, tankers, and bombers could be less than 48, 12, and 6 aircraft, respectively. However, the greatest potential for impact to the environmental resources evaluated in this EIS would occur from the operation of 48 fighter, 12 tanker, six bomber, and four Global Hawk aircraft. The potential impacts associated with operation of reduced numbers of aircraft would be less than that from operation of the number of aircraft needed to meet the objective. Therefore, this EIS assesses the potential impacts from the operation of as many as 48 fighters, 12 tankers, six bombers, and four Global Hawks, and the personnel associated with these numbers of aircraft, after full ISR/Strike operational capability is established at Andersen AFB.

Three Global Hawks would be Primary Assigned Aircraft (PAA), and one would be Backup Aircraft Inventory (BAI). PAAs are needed to accomplish the unit's assigned mission; BAIs allow the organization to maintain its required number of aircraft and operational capability when an aircraft is not available.

2.1.2 Identification of Location and Aircraft and Personnel Status Alternatives

2.1.2.1 Location Alternatives

In addition to the No Action Alternative, the Air Force identified installations with airfields on the following islands in the Pacific Air Forces (PACAF) Area of Responsibility as potential locations for the ISR/Strike capability:

Iwo Jima;
Saipan;
Diego Garcia;
Wake Island;
Hawaii; and
Guam.

2.1.2.2 Aircraft and Personnel Status Alternatives

The combinations of aircraft types and status options combine to total 48 different alternatives. Alternatives include, but are not limited to the following combinations:

- Base all four aircraft types and personnel;
- Base fighter, tanker, and bomber aircraft and personnel; rotate Global Hawks and personnel;

- Base fighter and tanker aircraft and personnel; rotate bomber and Global Hawks and personnel;
- Base fighter aircraft and personnel; rotate tanker, bomber, and Global Hawks and personnel;
- Base tanker and bomber aircraft; rotate fighter and Global Hawks and personnel;
- Base tanker and Global Hawk aircraft and personnel; rotate fighter and bomber aircraft and personnel;
- Base bomber and Global Hawk aircraft and personnel; rotate fighter and tanker aircraft and personnel;
- Rotate all four aircraft types and personnel;
- Rotate fighter, tanker, and bomber aircraft and personnel; base Global Hawks and personnel;
- Rotate fighter and tanker aircraft and personnel; base bomber and Global Hawk aircraft and personnel;
- Rotate fighter aircraft and personnel; base tanker, bomber, and Global Hawk aircraft and personnel.

2.1.3 Application of Selection Standards to the Location and Aircraft and Personnel Status Alternatives Considered

2.1.3.1 Application of Selection Standards to Location Alternatives Considered

The Air Force compared each possible location for the ISR/Strike capability in Subchapter 2.1.2.1 with the selection standards in Subchapter 2.1.1.1. Table 2.1-1 summarizes the selection process and the following discussion explains how the selection standards were applied to eliminate locations not considered “reasonable” from detailed analysis.

The use of wartime strike aircraft (long range fighters and/or bombers) operating from foreign lands is constrained by American senior military leaders from supporting and achieving national military objectives. Iwo Jima and Diego Garcia are located on foreign soil and would require a negotiated use by wartime commanders and, therefore, do not make sense for basing purposes. Japan’s national policy is to have a military capability to defend its borders and not have any offensive capability. Therefore, Iwo Jima and Diego Garcia were eliminated from further consideration.

Guam, Hawaii, and Wake Island do not have the political restrictions, such as those in Iwo Jima or Diego Garcia, that could impede U.S. military moves. Japan is defensive operations only versus a “strike” force that would be considered offensive operations. “Permission” to launch from a foreign country versus U.S. territory could have significant impacts to our national security. If on foreign territory, our host nation may not agree with U.S. on the crisis response. Even worse, our host country may side with those threatening our national security. Since Guam is a U.S. territory, third nation consultation for ISR/Strike establishment and operation would not be required.

Table 2.1-1 Application of Selection Standards to Location Alternatives

Selection Criteria	Iwo Jima	Saipan	Diego Garcia	Wake Island	Hawaii	Guam
A. Be on U.S. territory		✓		✓	✓	✓
B. Allow all elements of ISR/Strike to be on one installation					✓	✓
C. Allow deployed aircraft to reach areas of conflict and return to the same base		✓		✓		✓
D. Allow bomber aircraft to reach areas of conflict without additional airlift assets			✓		✓	✓
E. Allow Global Hawk aircraft to return to the installation at which they are based	✓ ¹	✓				✓
F. Have adequate existing airfield infrastructure			✓		✓ ²	✓
G. Have adequate base operating support or weapon storage areas			✓		✓ ³	✓

1. Japan's national policy is to have military capability to defend its borders and not have any offensive capability; therefore, Iwo Jima was eliminated from further consideration for strike capabilities.
2. Hawaii has adequate airfield infrastructure; however commercial operations would interfere with the military operations of ISR/Strike.
3. Hawaii has weapons storage areas; however any additional buildup is limited due to proximity distance required for weapon storage loading and unloading.

Intelligence, Surveillance, and Reconnaissance aircraft and support equipment such as the Global Hawk are national assets that are high demand/low density (for support) for supporting worldwide military requirements. Rarely do these national assets operate apart from other military support infrastructures. An exception is at austere forward operating locations with a very high level of security and support. As a matter of security, support infrastructure, the military principle of economy of force, and operating cost, national ISR assets are usually located at main operating bases throughout the world.

Neither Hawaii nor Wake Island can provide the military principle of economy of force, a reasonable operating cost, or the necessary unrestricted use of either national ISR assets or strike aircraft within a reasonable distance from their intended wartime operating locations.

Although bases on Hawaii have weapons storage areas, the ability to support increased capability such as that associated with ISR/Strike is limited due to the distance between weapon storage loading and unloading. Although Hawaii has adequate airfield infrastructure, the commercial aircraft operations would interfere with the ISR/Strike operations.

Splitting the ISR/Strike assets (*i.e.*, the tankers, fighters, bombers, Global Hawks) across two or more beddown locations would increase the footprint of the support facilities. Andersen

AFB has pre-positioned support facilities prepared to service rotational bombers, fighters, and tankers. By placing some assets on Andersen AFB and other assets at another location, the combined footprint of areas required to support the ISR/Strike mission would be exponentially increased. Increasing the footprint, in turn, increases the summed environmental impacts across all locations utilized. For example, construction of duplicate facilities (*e.g.*, security protection, aircraft maintenance, *etc.*) would be required because facilities at a single location are shared by more than one element of the ISR/Strike capability, thereby increasing the overall cost. Also, the element of surprise would be reduced if ISR/Strike aircraft are launched from two locations.

A new, emerging war on terror paradigm recognizes Guam's geographic importance as the U.S. territory closest to global hotspots of U.S. concern in Asia and the Middle East. Andersen AFB is ideally situated in the Western Pacific to provide easy reach to key regional strategic destinations. From Guam, combat aircraft would be within easy striking range of the region's likely potential hot spots, yet far enough from adversaries' missile-launch sites to limit the likely effects of such strikes. Guam is outside the short and medium ballistic missile range of Asian countries.

When discussing U.S. operations in the Pacific region, the concept of "tyranny of distance" is often used to describe the limits of military involvement in the region. "Tyranny of distance" is a military term describing the long distances forces must travel across the Pacific from the U.S. to reach operational targets. Locating the forces nearer to the targets increases the element of surprise and reduces operational constraints (*e.g.*, the number of aerial refuelings and length of duty for the aircrew).

Figure 2.1-1 shows the notional effective range for the Global Hawk operating from Andersen AFB. Although it depicts only notional Global Hawk range, the effective range concept for the Global Hawk in the figure applies to the other three aircraft types in the ISR/Strike capability. Locating the ISR/Strike capability further east would reduce the effective range for each of the aircraft types.

For the reasons in the preceding paragraphs, Andersen AFB was identified as the installation best suited to host the ISR/Strike capability in a process driven by the 2001 QDR (see Subchapter 1.1) and a process that considered six potential locations in Pacific Air Forces area of responsibility. By establishing the ISR/Strike capability at Andersen AFB, economy of force is preserved, costs are limited, and use of both the ISR and Strike assets is unrestricted for both peacetime and wartime.

2.1.3.2 Application of Selection Standards to Aircraft and Personnel Status Alternatives Considered

As stated in Subchapter 2.1, 32 CFR Part 989.8(b) states that "Reasonable alternatives are those that meet the underlying purpose and need for the proposed action...." The guidance also states: "If the Air Force identifies a large number of reasonable alternatives, it may limit alternatives selected for detailed environmental analysis to a reasonable number of examples covering the full spectrum of alternatives."

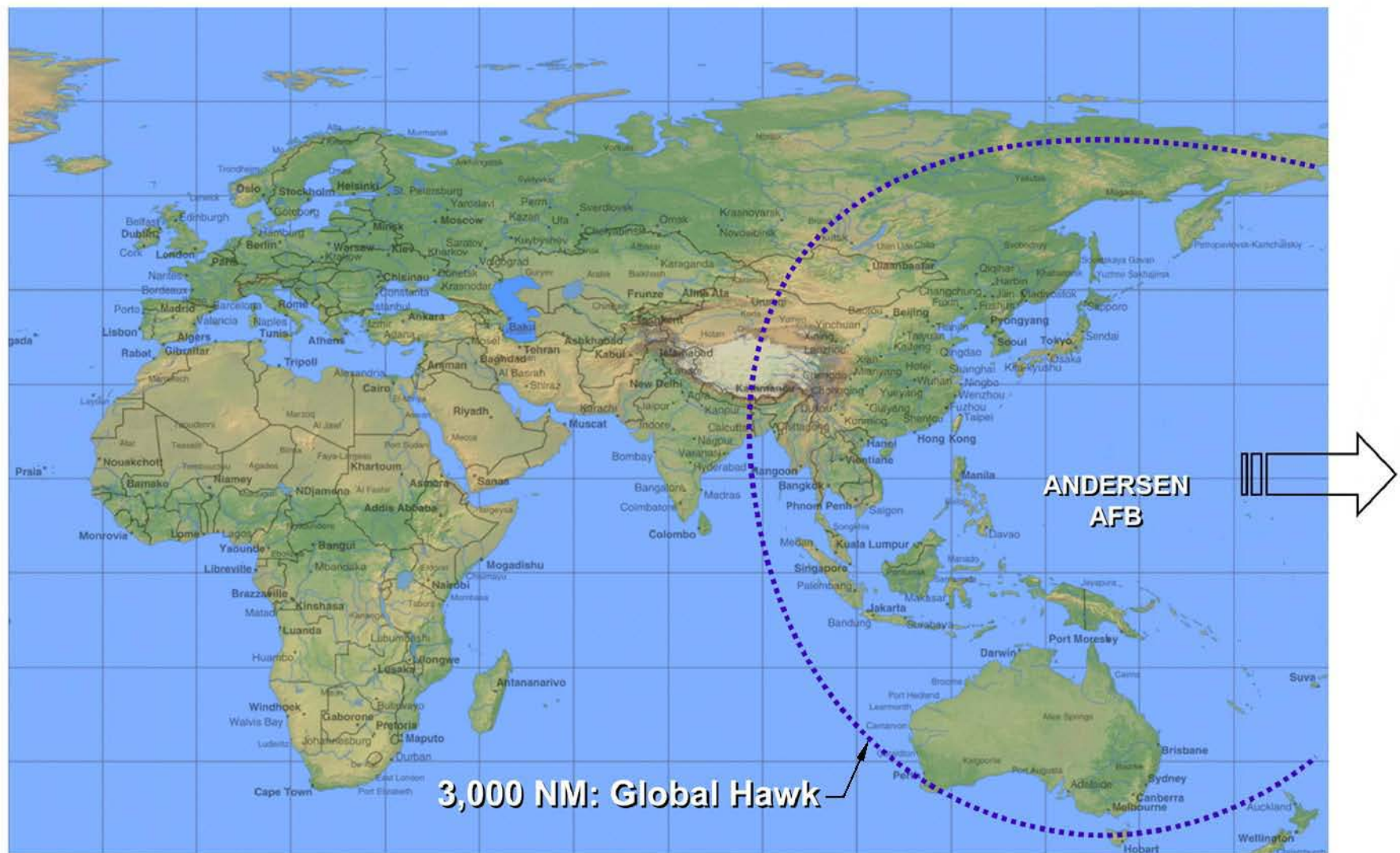


Figure 2.1-1

**Area of Global Hawk Coverage Associated
with Basing at Andersen AFB**

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Based on the guidance in the previous paragraph and the selection standards stated in Subchapter 2.1.1.2, the Air Force decided that aircraft and personnel status could best be accomplished through one of two alternatives that are analyzed in detail in this EIS. Analyzing additional alternatives within the range of the 48 potential alternatives identified in Subchapter 2.1.2.2 would not change the spectrum of analysis because the four specific aircraft types and a set number of each type are needed for the ISR/Strike capability (see Subchapter 2.1.1.2) and are included in each potential alternative. The specific details (*i.e.*, number of aircraft, levels and types of flying training activity, number of personnel, and the types and number of facilities) associated with the two alternatives analyzed in detail differ little from the 46 other possible alternatives because the numbers and types of aircraft needed for the ISR/Strike capability would be very similar for each alternative. Likewise, each of the alternatives is very similar in terms of aircrew training.

2.1.4 No Action Alternative

The Air Force EIAP (32 CFR 989.8(d)) states: “Except in those rare instances where excused by law, the Air Force must always consider and assess the environmental impacts of the ‘no action’ alternative.” Thus, the alternative of not establishing an ISR/Strike capability was also identified (No Action Alternative) and is analyzed in detail in this EIS.

2.2 PROPOSED ACTION

The proposed action would establish an ISR/Strike operational capability in four phases over a 16-year period through one of the two action alternatives (Alternative A and Alternative B). The phases are the same for each alternative. Construction would begin in FY07 and occur over an approximate 16-year period. Initiation of construction activities prior to the initial operational capability established with arrival of the first aircraft in Phase 0 is necessary to ensure the required facilities are in place to support aircraft operations. Construction is subject to Congressional funding. Due to possible funding shifts, construction could be delayed and extended. The operational capability phases and the approximate years associated with the phases are:

- FY07-10, Phase 0;
- FY11-15, Phase 1;
- FY16-18, Phase 2; and
- FY19 and beyond, Phase 3.

The number of fighter (F-22 and F-15E) and tanker (KC-135) aircraft and associated personnel would increase throughout the 16-year period. The number of bomber (B-1, B-2, and B-52) and Global Hawk aircraft and personnel would remain constant throughout the implementation. As many as 70 ISR/Strike aircraft would be at Andersen AFB after full establishment.

All ISR/Strike activities at Andersen AFB would occur on the main base of the installation. Facility construction, addition, and alteration projects would occur to support ISR/Strike operational activities.

Andersen AFB is located at the northern end of the U.S. Territory of Guam, which is the southernmost and largest of the islands within the Mariana Islands archipelago. Guam is approximately 3,600 miles west southwest of Hawaii, and 1,550 miles southeast of Japan. Figure 2.2-1 indicates the location of Guam, and Figure 2.2-2 shows Andersen AFB and the Base's Northwest Field. Part of Andersen AFB is within the Guam National Wildlife Refuge Overlay, most of which is contained in Northwest Field. The Overlay is managed by the Air Force for protection of wildlife in cooperation with the USFWS.

The 36th Wing is the host unit at Andersen AFB. The major tenant units include the 734th Air Mobility Support Squadron, Navy Helicopter Sea Combat Squadron 25 (HSC-25), 750th Space Squadron, and the Guam Air National Guard. The primary mission of Andersen AFB is to maintain the manpower infrastructure to provide support for tactical and strategic peacetime, contingency, and wartime deployment and employment operations, strategic airlifts, transient support, and staging operations.

2.2.1 Description of Alternative A

At full implementation and operation, the ISR/Strike capability under Alternative A would base as many as 12 KC-135s and four Global Hawks and personnel at Andersen AFB and rotate as many as 48 fighters (F-22 and F-15E) and six bombers (B-1, B-2, and B-52) and personnel from bases within the 50 states. The ISR/Strike aircraft, when added to the 14 HSC-25 helicopters currently based at Andersen AFB, would increase the number of based and rotational aircraft to as many as 84. The rotational period for aircraft and personnel would be 120 days.

Table 2.2 -1 summarizes the number of aircraft by aircraft type and the personnel changes for the operational phases. The Base population could increase to as many as 8,900 personnel if as many as 3,000 additional personnel associated with Alternative A would be added to the current population of 5,900 persons (Andersen AFB 2004a). The 3,000 personnel include military, Air Force civilian, contractor, and dependent personnel.

It is expected that as many as 650 permanently assigned personnel would be at Andersen AFB for 2 to 3 years at a time. Based on a 3-year assignment duration, about 220 of the permanently assigned personnel and associated dependents would depart Andersen AFB each year. These individuals would travel to and from Guam and Andersen AFB by commercial air carrier flights that use Guam International Airport. The majority of household goods belonging to the permanently assigned personnel would be shipped as cargo in ships. Thus, there could be an additional approximate 220 household goods shipments each year requiring BTS inspection. Small portions of household goods for each assigned person and dependents would be shipped as air freight on routine cargo movement flights from Andersen AFB.

Based on three rotations per year and 48 fighter aircraft, six bomber aircraft, and 1,250 personnel per rotation, it is estimated that 324 flights and 3,750 personnel would rotate to/from Andersen AFB annually. One hundred sixty-two of the rotational fighter and bomber flights would be departures from Andersen AFB. Rotational personnel would travel to and from Andersen AFB by contract commercial aircraft. Approximately 32 flights would be required to transport these personnel to and from the Base, 16 of which would be departures from Andersen AFB. There would be a combined 194 aircraft departures related to aircraft rotations, or an average of less than one aircraft each day, requiring BTS inspection.

Table 2.2-1 Aircraft and Personnel Associated with Alternative A

	Phase			
	Phase 0	Phase 1	Phase 2	Phase 3
Number of Aircraft				
Based				
Tanker	6	12	12	12
Global Hawk	4	4	4	4
Rotational				
Fighter	12	24	24	48
Bomber	6	6	6	6
Total	28	46	46	70
Number of Personnel				
Permanent				
Tanker	300	550	550	550
Global Hawk	50	50	50	50
Support	50	50	50	50
Subtotal	400	650	650	650
Rotational				
Fighter	300	500	500	900
Bomber	350	350	350	350
Subtotal	650	850	850	1,250
Total	1,050	1,500	1,500	1,900
Number of Permanent Personnel Accompanied by Dependents, not Accompanied by Dependents, and Dependents				
Unaccompanied	100	200	200	200
Accompanied	300	450	450	450
Dependents	750	1,100	1,100	1,100
Summary of Additional Personnel Resulting from Alternative A				
Permanent	400	650	650	650
Rotational	650	850	850	1,250
Dependents	750	1,100	1,100	1,100
Total	1,800	2,600	2,600	3,000
Resulting Base Population by Combining Alternative A Population with Current Base Population				
Alternative A	1,800	2,600	2,600	3,000
Current Population	5,900	5,900	5,900	5,900
Total	7,700	8,500	8,500	8,900

Note: The data in the Number of Personnel section of the table reflect military, Air Force civilian, and contractor personnel. Number of dependents is based on an average of 2.5 dependents per accompanied individual and rounded to the nearest 50. The number of fighter, tanker, and bomber aircraft and personnel reflect an "as many as" condition.

Equipment and other items necessary to support rotational aircraft operations would be retained at the Base from rotation to rotation, thereby minimizing the need for flights to move equipment to and from Andersen AFB in conjunction with the rotational aircraft. Rotational personnel would bring only personal effects which could be accommodated as baggage on the aircraft on which the individuals travel.

Aircraft Operations

Table 2.2-2 lists the projected annual and average daily airfield operations for the ISR/Strike aircraft at Andersen AFB under Alternative A and reflects the total recurring airfield operations

condition after the ISR/Strike capability is fully established. Operations for the ISR/Strike aircraft include mission arrivals and departures as well as training sortie arrivals and departures, and closed pattern operations. The following paragraphs describe mission and training sorties for each ISR/Strike aircraft type that would be at Andersen AFB under Alternative A. Table 2.2-3 lists the annual number of sorties, average sortie duration, and annual flying hours for ISR/Strike aircraft.

Table 2.2-2 Alternative A Annual and Average Daily Airfield Operations

Aircraft	Arrival and Departure Operations		Closed Pattern Operations		Total Operations	
	Annual	Avg. Daily	Annual	Avg. Daily	Annual	Avg. Daily
ISR/Strike Aircraft						
Fighter						
F-22	5,530	23.04	16,589	69.12	22,119	92.16
F-15E	1,382	5.76	4,147	17.28	5,529	23.04
Fighter Subtotal	6,912	28.80	20,736	86.40	27,648	115.20
KC-135	1,920	8.00	5,760	24.00	7,680	32.00
Global Hawk	440	2.00	220	1.00	660	3.00
Bomber						
B-1	432	1.80	864	3.60	1,296	5.40
B-2	96	0.40	192	0.80	288	1.20
B-52	432	1.80	864	3.60	1,296	5.40
Bomber Subtotal	960	4.00	1,920	8.00	38,868	12.00
Subtotal ISR/Strike Aircraft	10,232	42.80	28,636	119.40	38,868	162.20
Other Military	25,144	68.88	59,648	163.42	84,792	232.30
Transient Civil	942	2.58	0	0.00	942	2.58
Total	36,318	114.26	88,284	282.82	124,602	397.08

Note: See Table 2.3-1 for detailed transient military and civil aircraft for the baseline condition. Fighter, tanker, and bomber operations are based on 240 days per year of operations and the Global Hawk operations are based on 220 days per year. An airfield operation is the single movement or individual portion of a flight in the airfield airspace environment, such as one departure (takeoff), one arrival (landing), or one transit through the airport traffic area. The airfield airspace environment typically is referred to as airspace allocated to the air traffic control tower and includes the airspace within an approximate 5-mile radius of the airfield and up to 2,500 feet above ground level. A low approach or a missed approach consists of two airfield operations, i.e., one arrival and one departure. A closed pattern consists of two airfield operations (i.e., one takeoff and one landing accomplished as a touch and go). The minimum number of airfield operations for one sortie is two operations, one takeoff (departure) and one landing (arrival). The ISR/Strike operations represent the operations associated with as many as 48 fighter, 12 KC-135, and six bomber aircraft.

Table 2.2-3 Annual Sorties, Average Sortie Duration, and Annual Flying Hours for ISR/Strike Aircraft

Aircraft	Annual Sorties	Average Sortie Duration	Annual Flying Hours
F-22	2,765	1.50	4,148
F-15E	691	1.84	1,271
KC-135	960	4.46	4,282
Global Hawk	220	35.00	7,700
B-1	216	5.00	1,080
B-2	48	5.19	249
B-52	216	7.00	1,512

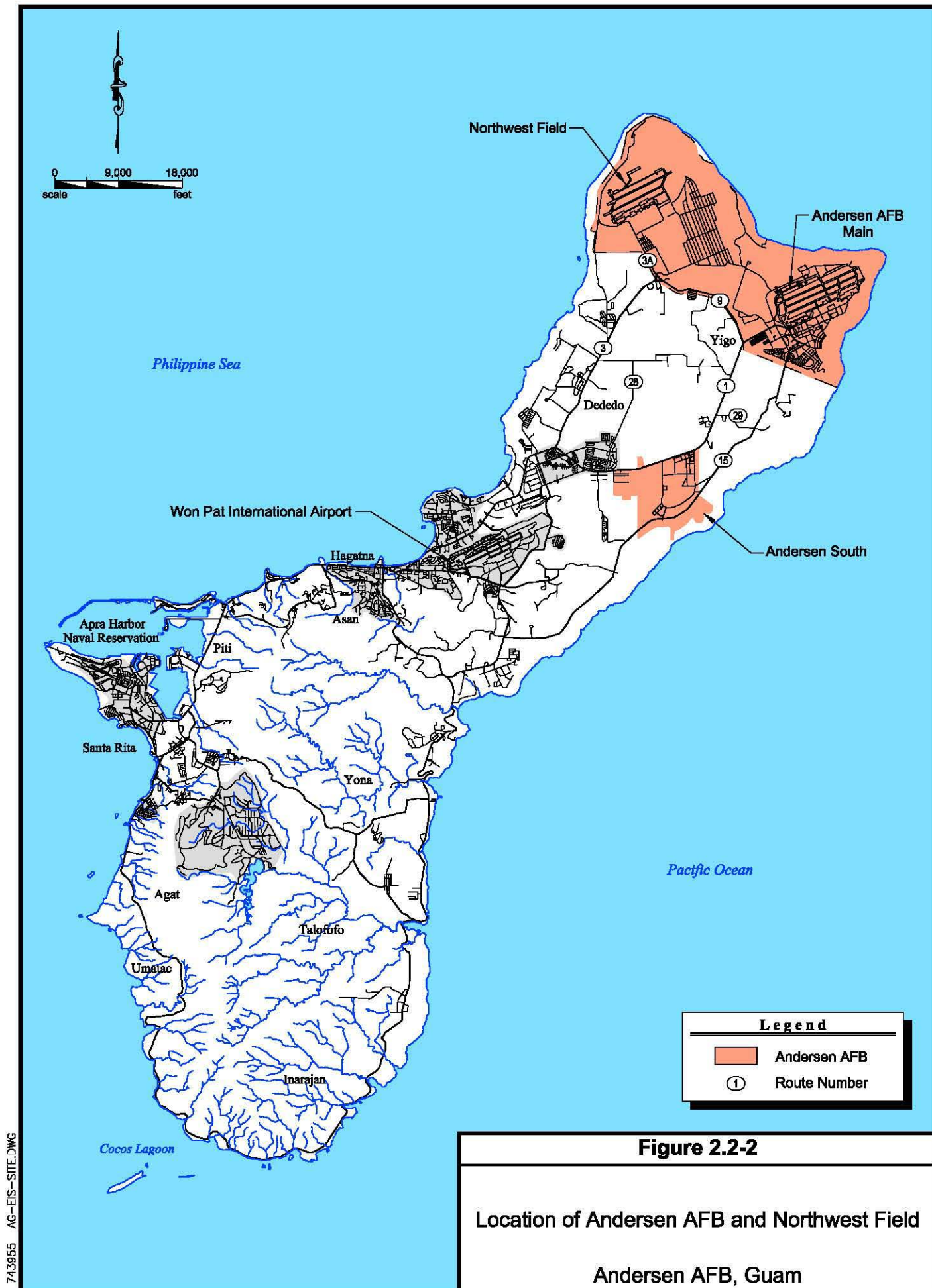
Sources: Parsons 2005; Ostil 2006b.



Figure 2.2-1

Location of Guam

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The Air Force balances the potential for noise disturbance with the overall training needs when scheduling flight operations. In this respect, if at all possible, the Air Force avoids operations during times when the potential for noise disturbance is greater (*i.e.*, between 10:00 p.m. and 7:00 a.m.). However, there are times when flight operations cannot be avoided when the potential for noise disturbance is greater due to operational necessity and the need to conduct training during that time.

Draft EIS Comment: It would be helpful if the flight increases occur at appropriate times of the day in consideration to the nearby community.

Response: The rationale for not accomplishing operations during the “appropriate” times of the day was added to the Aircraft Operations section of Subchapter 2.2.1.

Fighter. Flights would occur 240 days per year. Each of the 48 rotational fighter aircrews would fly 72 sorties per year, for a total of 3,456 annual sorties, or an average of 14.4 sorties per flying day. Eighty percent of the fighter operations would be accomplished by F-22 aircraft and 20 percent would be accomplished by F-15Es. About 30 percent of the training sorties would be accomplished after dark. For the purpose of meeting this requirement, darkness ranges between 30 minutes after sunset to 30 minutes before sunrise. It is estimated that about 5 percent of the sorties and airfield operations flown during darkness (*i.e.*, 5% of 30%, or 1.5%) would occur between 10:00 p.m. and 7:00 a.m., the period known as “environmental nighttime” (referred to as “nighttime” in this EIS). Environmental nighttime receives special consideration for noise analysis because it represents a period when the effects of aircraft noise on people are accentuated.

The F-22 and F-15E aircraft would conduct numerous training activities to fulfill mission requirements. Table 2.2-4 describes the projected F-22 and F-15E training events, airspace type that can be used for training, and the time aircraft would be in the airspace. F-22 training flights would closely match those performed by operational F-15E aircraft in terms of nature and duration. The F-22 would fly 1.5 to 2.0 hour-long missions, including takeoff, transit to and from the range/training airspace (*i.e.*, FDM), training activities, closed pattern events at the airfield, and landing. Depending on the distance and type of training activity, the F-22 and F-15E could spend 20 to 60 minutes in a training airspace. On occasion during an exercise, the F-22 and F-15E may spend up to 90 minutes in one or a set of airspace units. The F-22 and F-15E would conduct a majority of training in the ATCAAs and Warning Area 517 around Guam and FDM. A Warning Area is military training airspace off the coast of the United States or its territories. Warning Areas serve to alert non-participating pilots of potential hazards associated with the airspace. Warning Areas provide airspace for supersonic maneuvers, which are practiced by both the F-22 and F-15E. Figure 2.2-3 depicts the ATCAAs around Guam and FDM. Guam is at the approximate center of the figure and FDM is in R7201.

The F-22 could use the full, authorized capabilities of the airspace units from 500 feet above ground level (AGL) to above 60,000 feet above mean sea level (MSL). The F-22 and F-15E would rarely (5% or less) fly below 5,000 feet AGL and consistently fly from 10,000 feet AGL to above 30,000 feet MSL. Actual flight altitudes would depend on the lower and upper limits of specific airspace units.

The F-22 has an air-to-ground mission. F-22 pilots are projected to spend 80 percent of their training in air-to-air missions and 20 percent of their training in air-to-ground training. Most air-to-ground training would be simulated, where no munitions would be released from the aircraft.

The F-22 uses avionics to simulate ordnance delivery on a target. This type of training could be conducted in any of the airspace units and would not require an air-to-ground range.

Table 2.2-4 Projected F-22 and F-15E Training Activities

Training Activity	Description	Airspace Type	Altitude (feet)	Time in Airspace
Aircraft Handling Characteristics	Training for proficiency in use and exploitation of the aircraft's flight capabilities (consistent with operational and safety constraints) including, but not limited to high/maximum angle of attack maneuvering, energy management, minimum time turns, maximum/optimum acceleration and deceleration techniques, and confidence maneuvers.	MOA and ATCAA	5,000 AGL to 60,000 MSL	0.5 to 1.0 hour
Basic Fighter Maneuvers	Training designed to apply aircraft (1 versus 1) handling skills to gain proficiency in recognizing and solving range, closure, aspect, angle, and turning room problems in relation to another aircraft to either attain a position from which weapons may be launched, or defeat weapons employed by an adversary.	MOA and ATCAA	5,000 AGL to 30,000 MSL	0.5 to 1.0 hour
Air Combat Maneuvers	Training designed to achieve proficiency in formation (2 versus 1 or 2 versus 1+1) maneuvering and the coordinated application of Basic Fighter Maneuvers to achieve a simulated kill or effectively defend against one or more aircraft from a pre-planned starting position. Use of defensive countermeasures (chaff, flares). Air Combat Maneuvers may be accomplished from a visual formation or short-range to beyond visual range.	MOA and ATCAA	5,000 AGL to 60,000 MSL	0.5 to 1.0 hour
Low-Altitude Training	Aircraft offensive and defensive operations at low altitude, G-force awareness at low altitude, aircraft handling, turns, tactical formations, navigation, threat awareness, defensive response, defensive countermeasures (chaff/flares) use, low-to-high and high-to-low altitude intercepts, missile defense, combat air patrol against low/medium altitude adversaries.	MOA	500 AGL to 5,000 AGL	0.5 to 1.0 hour
Tactical Intercepts	Training (1 versus 1 up to 4 versus multiple adversaries) designed to achieve proficiency in formation tactics, radar employment, identification, weapons employment, defensive response, electronic countermeasures, and electronic counter countermeasures.	MOA and ATCAA	500 AGL to 60,000 MSL	0.5 to 1.0 hour
Night Operations	Aircraft intercepts (1 versus 1 up to 4 versus multiple adversaries) flown between the hours of sunset and sunrise, including tactical intercepts, weapons employment, offensive and defensive maneuvering, chaff/flare, and electronic countermeasures.	Warning Area, MOA and ATCAA	2,000 AGL to 60,000 MSL	0.75 to 1.5 hour
(Dissimilar) Air Combat Tactics	Multi-aircraft and multi-adversary (2 versus multiple to larger force exercises) conducting offensive and defensive operations, combat air patrol, defense of airspace sector from composite force attack, intercept and simulate and destroy bomber aircraft, destroy/avoid adversary ground and air threats with simulated munitions and defensive countermeasures, strike-force rendezvous and protection.	MOA and ATCAA	500 AGL to 60,000 MSL	0.5 to 1.0 hour

Table 2.2-4 Projected F-22 and F-15E Training Activities (continued)

Training Activity	Description	Airspace Type	Altitude (feet)	Time in Airspace
Navigation and Basic Surface Attack	Navigation on MTRs and air-to-ground simulated delivery of ordnance on a range.	MOA, Range	Surface to 18,000 MSL	0.5 to 1.0 hour
Tactical Weapons Delivery	More challenging multiple attack headings and profiles; pilot is exposed to varying visual cues, shadow patterns, and the overall configuration and appearance of the target. Supersonic speeds that can include target acquisition are added to the challenge.	ATCAA, MOA, Range	Surface to 60,000 MSL	0.5 to 1.0 hour
Surface Attack Tactics	Practiced in a block of airspace such as a MOA or Restricted Area that provides room to maneuver up to supersonic speeds. Defensive countermeasures may be deployed. Precise timing during the ingress to the target is practiced, as is target acquisition. Training includes egress from the target area and reforming into a tactical formation.	ATCAA, MOA, Range	Surface to 60,000 MSL	0.5 to 1.0 hour
LRsOW Delivery	Practiced in an MOA or ATCAA that provides for maneuvering room and supersonic speeds. Precise timing for speed, altitude, and launch parameters is practiced at high altitudes without release. Use of inert munitions in low altitude drops to evaluate timing and aircraft performance. Remote training using LRsOW at authorized ranges outside Alaska.	ATCAA, MOA Range	Surface to 60,000 MSL	0.5 to 1.0 hour
Suppression of Enemy Air Defenses	Highly specialized mission requiring specific ordnance and avionics and can include supersonic speeds and defensive countermeasures. The objective of this mission is to simulate neutralizing or destroying ground-based anti-aircraft systems	ATCAA, MOA, Range	Surface to 60,000 MSL	0.5 to 1.0 hour
Large Force Exercises/Mission Employment	Multi-aircraft and multi-adversary composite strike force exercise (day or night), air refueling, strike force rendezvous, conducting air-to-ground strikes, strike force defense and escort, air intercepts, electronic countermeasures, electronic counter-counter measures, combat air patrol, defense against composite force, bomber intercepts, destroy/disrupt/avoid adversary fighters, defensive countermeasure (chaff/flare) use.	MOA, MTR, ATCAA, and Range	Surface to 60,000 MSL	0.5 to 1.0 hour

Note: WA = warning area, MTR = Military Training Range; MSL = mean sea level; LRsOW = Long Range Standoff Weapon; AGL = above ground level.

Air-to-ground training also includes ordnance delivery training. Ranges currently used for F-15E training offer limited target capabilities. All ordnance delivery training would adhere to the requirements and restrictions of the ranges. Table 2.2-5 presents the current F-15E air-to-ground munitions used in training and the projected F-22 training munitions. Although several different types of smaller munitions are being studied for the F-22, the primary air-to-ground ordnance carried by the F-22 is the Guided Bomb Unit (GBU)-32 and a Small Diameter Bomb (SDB) (GBU-39/B). The GBU-32 is a 1,000-pound equivalent variant of the Joint Direct Attack Munition (JDAM). JDAMs are guided to the target by an attached Global Positioning System (GPS) receiver. SDBs are guided 250-pound equivalent munitions. Training with these

weapons in airspace could include accelerating to launch speed, altitude, and delivery profile prior to opening the weapons bay.

Table 2.2-5 Current and Projected Annual Air-to-Ground Munitions

Training Munition Class	F-15E	F-22
25 pound	590	0
250 pound	0	200
500 pound	57	0
1,000 pound	0	50
2,000+ pound	30	0
Total	677	250

Note: Data in table reflect the number of munitions by munitions type and aircraft type.

In combat, these weapons could be released by an F-22 at supersonic speeds at altitudes up to 50,000 feet MSL. Actual ordnance delivery training at approved delivery profiles would occur during the times when F-22 squadrons would be deployed to other locations during special training cycles. Locations where levels of munition training is authorized could include the Nellis Range Complex in Nevada, the Utah Test and Training Range, and the approved ranges associated with Eglin AFB. The negligible level of use of these remote ranges and the current level of use by others suggest that projected F-22 use does not warrant additional detailed environmental analysis for these ranges. F-22 flight profiles, altitudes, and speed would be restricted to ensure that such munitions meet approved range weapon safety footprints.

Tanker. Based KC-135 aircrews would fly four sorties per day, 240 days per year from Andersen AFB. A typical sortie would include a departure from the Base, aerial refueling of receiver aircraft, and an arrival at Andersen AFB followed by an average of 60 to 90 minutes of instrument approach and closed pattern training at the Base before termination. It is estimated that about 13 percent of airfield operations for the tankers would occur during nighttime.

Unmanned Aerial Vehicle. The based Global Hawks would fly one sortie per day, 220 days per year from Andersen AFB. A typical sortie would include departing from the Base, conducting its mission or training, and then return to Andersen AFB. A closed pattern would be flown on approximately half of the sorties. It is estimated that about 15 percent of airfield operations for the Global Hawks would occur during nighttime.

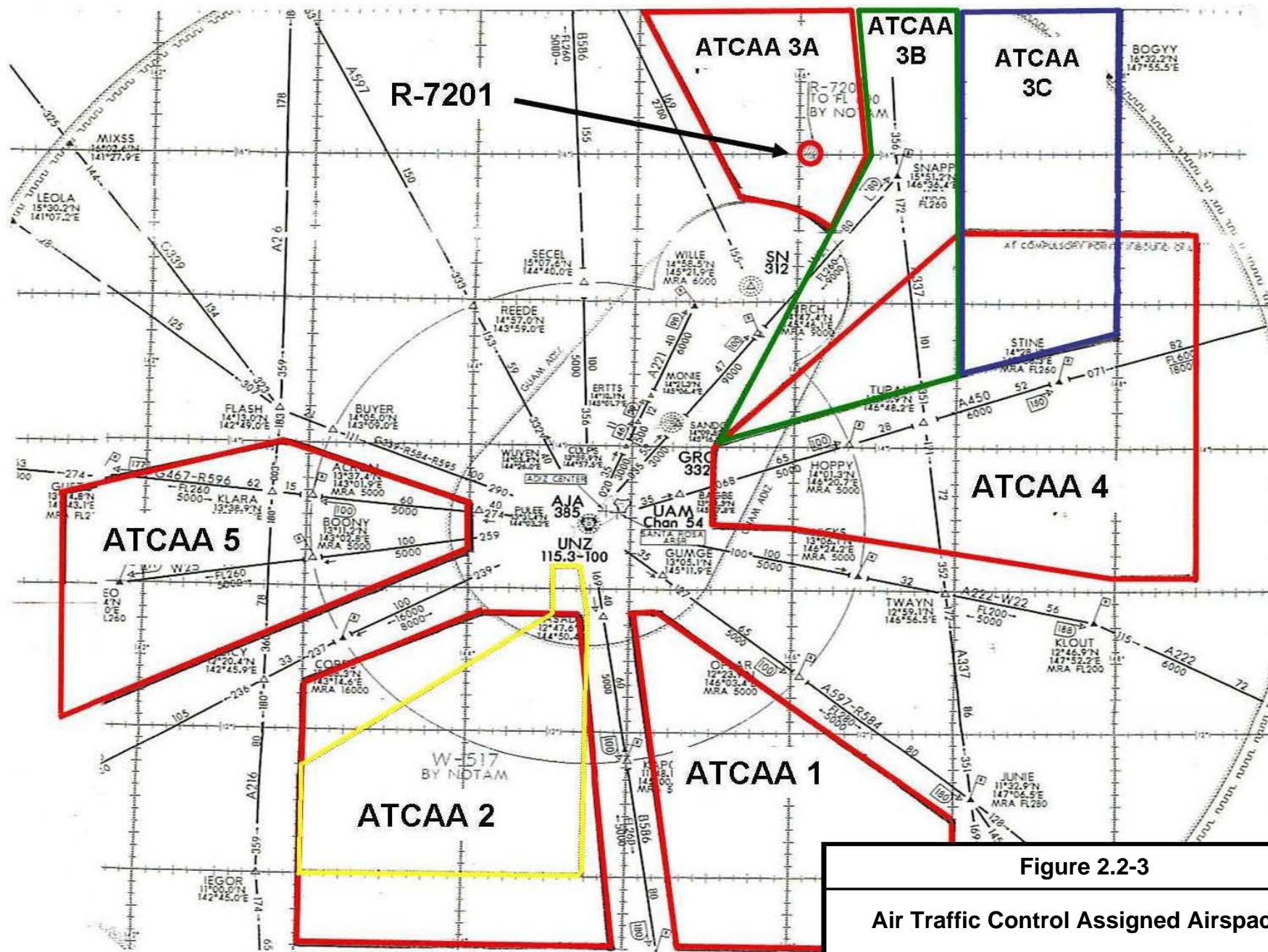


Figure 2.2-3

Air Traffic Control Assigned Airspaces

Andersen AFB, Guam

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Bomber. Rotational bomber aircrews would fly two sorties per day, 240 days per year from Andersen AFB. The percents of bomber operations would be: 10 percent B-2; 45 percent B-1; and 45 percent B-52. A typical sortie would include a departure from the Base, weapons training at a range/training airspace (*i.e.*, FDM) complex, low level terrain avoidance procedures training, anti-ship mining operations, and an arrival at Andersen AFB followed by two closed patterns before termination. It is estimated that about 13 percent of airfield operations for the bombers would occur during nighttime. Since 1990, there has been a persistent rotational presence of bombers at Andersen AFB. The average annual ordnance from rotational bombers are included in Table 2.2-6:

Table 2.2-6 Annual Ordnance Release from Rotational Bombers

Munition	Training Munitions Class	Released
BDU 50	500 lb practice bomb	50
GBU 31	2000 lb JDAM bomb	23
M117	750 lb bomb	672
Mk 82	500 lb bomb	150
BDU 56	Inert 2000 lb bomb	39
MJU 23	Flare/chaff	519
RR 188	Chaff cartridge	519
Mk 107	Impulse cartridge	8
Total	--	1,980

The projected ordnance release for ISR/Strike bombers at FDM presented in Table 2.2-6 would not exceed that assessed for bombers at FDM in the Marianas Training EIS (*i.e.*, 7,344 live and inert bombs). Currently, there are no plans to expand the airspace and training ranges for the bombers.

2.2.1.1 Facility Construction and Operation

Numerous construction and building addition/alteration projects would be constructed over an approximate 16-year period to support establishment and operation of the ISR/Strike capability at Andersen AFB. Figure 2.2-4 depicts the locations for the construction projects. Table 2.2-7 lists details for the projects. Table 2.2-8 lists the forest habitat that would be cleared for facility construction associated with Alternative A. New facilities that have washracks would have oil/water separators designed into wastewater disposal systems.

No surface discharge of water from oil/water separators would be allowed. All new wastewater systems are evaluated to determine if necessary, what size and type of treatment is required before wastewater is sent to the sewer system. Vegetative waste from clearing and construction activities would be diverted from the landfill and would be mulched and composted.

Under EO 13123, *Greening the Government through Efficient Energy Management*, the facilities that would be constructed should incorporate pollution prevention, energy, and water conservation and water quality goals into facilities and activities where practicable. In addition to EO 13123, the DoD signed an Memorandum of Understanding (MOU) on January 24, 2006 entitled “*Federal Leadership in High Performance and Sustainable Buildings*” which committed federal agencies to design, construct and operate their facilities in an energy-efficient and

sustainable manner. Through the MOU, the DoD agreed to: reduce the energy cost budget by 30 percent for new construction and 20 percent for major renovations; employ strategies to reduce indoor and outdoor water use and reduce stormwater runoff and pollution; use products with recycled content; and use bio-based products made from rapidly renewable resources and certified sustainable wood products.

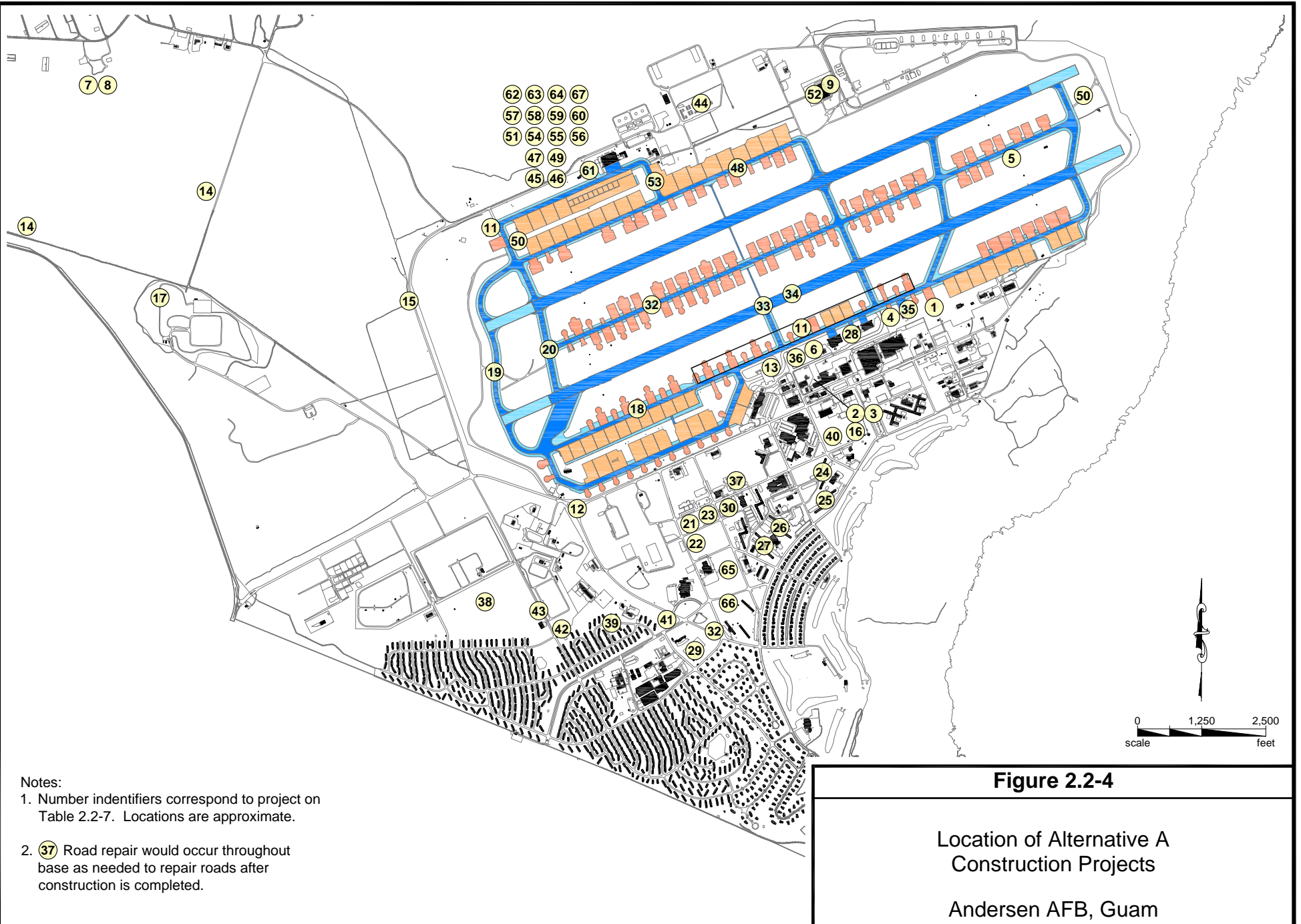
The new facilities and military family housing units would be constructed to meet the Air Force policy to implement, where feasible, noise level reduction (NLR) measures in on-Base residential and public use buildings. Since implementation of NLR standards, all new buildings are designed and constructed to comply with the appropriate NLR standards to achieve an indoor noise level of DNL 45 dBA or less (USAF 1978). In June 2002, the American National Standards Institute, Inc. (ANSI) released a new classroom acoustics standard. Compliance with the standard is voluntary; however, school boards and municipalities may reference the standard for new school projects. The goal is to achieve a learning space with low background sound levels and reverberation times in which people would be able to communicate effectively. The new standard establishes an hourly A-weighted average sound level of 40 decibels (dB) which must not be exceeded for more than 10 percent of the hour (ANSI 2002). This standard would be implemented when constructing the new high school and when existing schools on Andersen AFB are modernized.

Draft EIS Comment: Identify significance criteria for the analysis of noise impacts in the Final EIS. We recommend that EPA's recommended DNL of 55 dBA for residences, schools and hospitals be used.

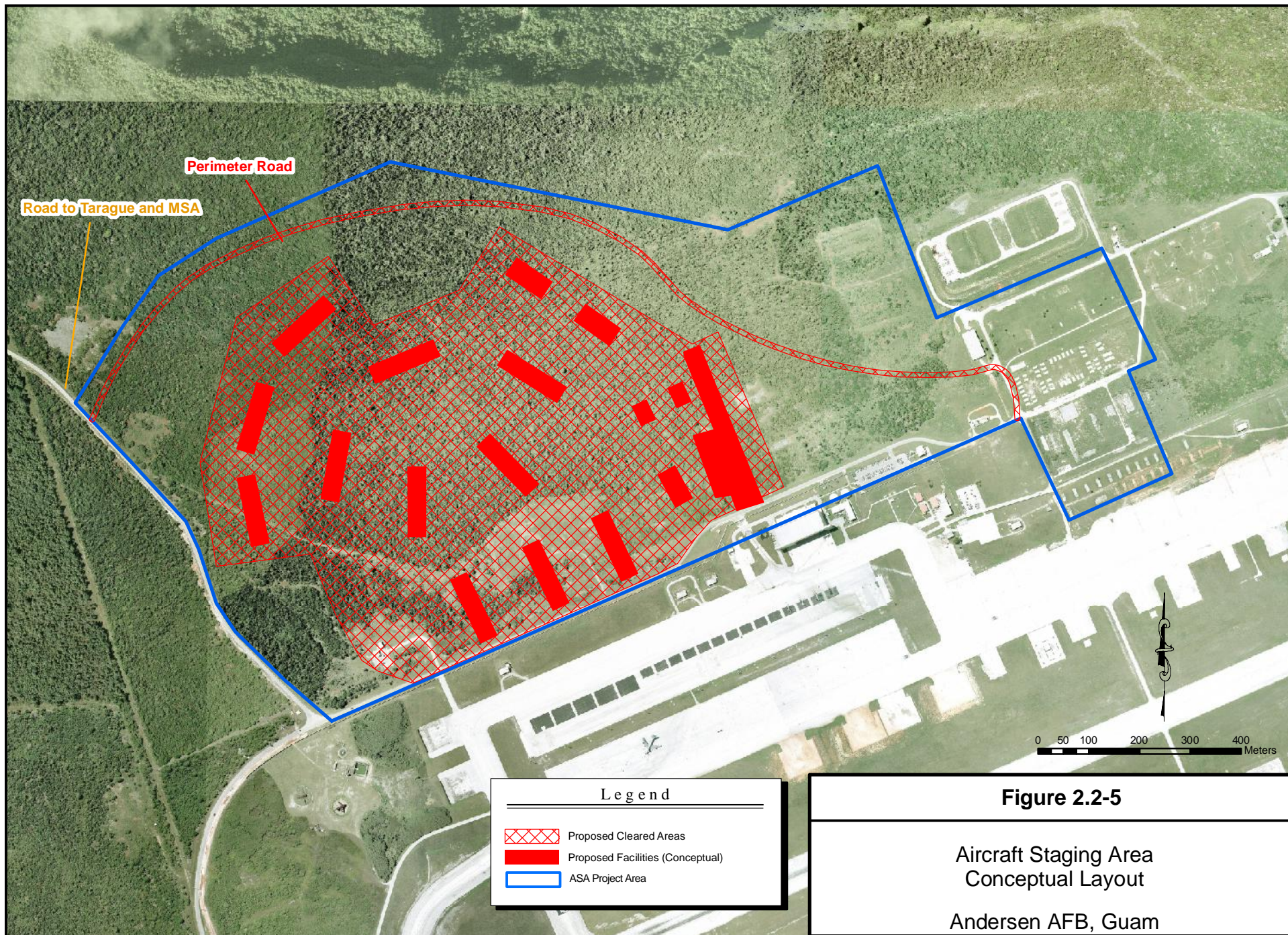
Response: The criteria are listed at the beginning of the noise section of Chapter 4 and include the factors considered. Additionally, text in Subchapter 3.1.1 discusses why the Air Force uses DNL 65 dBA for impact analysis. The analysis in the FEIS was improved and modified by further analyzing the issues noted in the comment by adding text to Subchapters 2.2.1.1 and 4.1.1.1 that states that all new on-Base residential and public use buildings will be designed and constructed to comply with the appropriate NLR standards to achieve an indoor noise level of DNL 45 dBA or less.

Aircraft Staging Area. Approximately 23 different facilities, taxiways, and aircraft parking aprons would be constructed to support F-22 and F-15E operations. These projects are collectively referred to as the aircraft staging area (ASA). Figure 2.2-5 shows the conceptual layout and relative sizes of the proposed ASA complex. Approximately 74 hectares (183 acres) would be cleared for the ASA facilities and road construction.

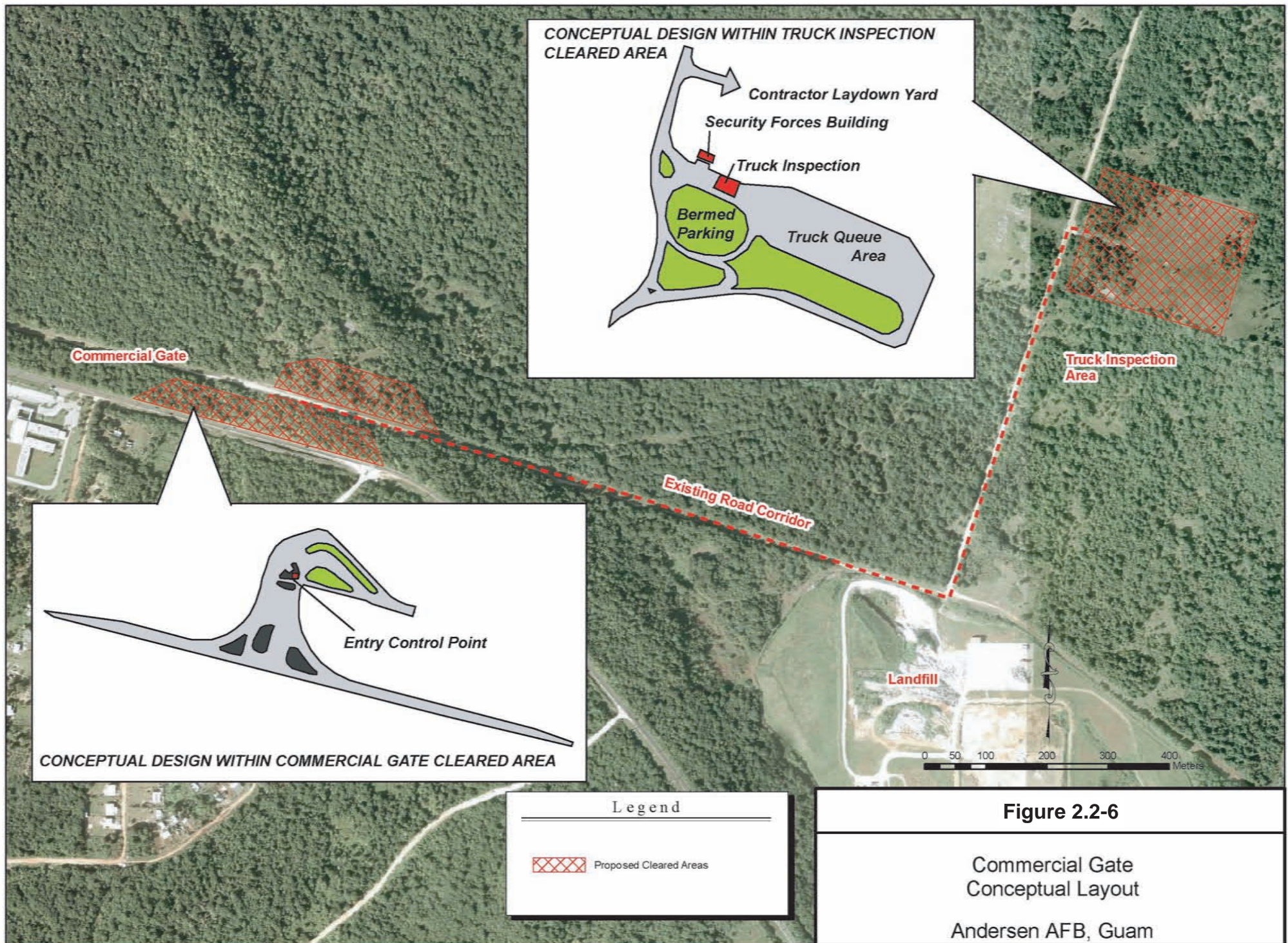
Commercial Gate. The Commercial Gate project consists of three elements: constructing an Entry Gate; constructing a Truck Inspection Facility between the Entry Gate and the western end of the airfield; and repaving an existing road between the Entry Gate and the Truck Inspection Facility sites (see Figure 2.2-6). All commercial vehicles would enter the Commercial Gate but would exit the Base via the Main Gate. An estimated 200 commercial vehicles would enter the Base through the Commercial Gate, which likely would operate from 6:00 a.m. to as late as 9:00 p.m.



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Table 2.2-7 Alternative A Construction Project Information

Project	Project Number on Figure 2.2-4	New Construction (Square Feet)	Demolition (Square Feet)
Global Hawk Operations/Maintenance Facility	1	57,500	3,769
Construct Commercial Gate	14	--	--
Fuel Cell Maintenance Hangar	4	52,417	0
Clear Water Rinse Facility	5	173,943	0
Fighter Tactical Missile Maintenance (Precision Guided Munitions) Facility	7	10,250	0
Realign Arc Light Boulevard	12	225,000	225,000
Electrical Power Station Upgrade (20 megawatt substation)	15	0	0
Corrosion Control Hangar	28	52,417	0
AGE Covered Storage	36	12,940	0
Repair Taxiway D	48	--	--
Maintenance Hangar/Aircraft Maintenance Unit	6	52,417	0
Conventional Missile Maintenance Facility	8	11,000	0
Landfill Expansion	17	217,801	0
Repair Taxiway Bravo	18	--	--
Dorms Construction, Phase 1, 240 Rooms	21	--	0
Dorms Construction, Phase 2, 240 Rooms	22	--	0
Convert Dorms to AEF Lodging, Phase 1, 126 Rooms	24	--	0
Convert Dorms to AEF Lodging, Phase 2, 126 Rooms	25	--	0
Repair Taxiway Foxtrot	20	--	--
Repair Taxiway Charlie	32	--	--
Airmen Dining Facility	30	18,400	0
Fire Station	31	30,349	0
Military Family Housing Office	41	5,619	0
Military Family Housing Supply and Storage	42	4,155	0
Military Family Housing Warehouse	43	6,975	0
Dorms Construction, Phase 3, 240 Rooms	23	--	0
Convert Dorms to AEF Lodging, Phase 3, 126 Rooms	26	--	0
Convert Dorms to AEF Lodging, Phase 4, 126 Rooms	27	--	0
North Ramp Water Infrastructure	46	--	--
AEF Support Hangar	35	52,417	0
Armament System Shop (Mod Bldg 51104)	50	800	
Repair South Runway, Phase 1	33	--	--
Repair Roads after Construction Traffic	37	--	--

Table 2.2-7 Alternative A Construction Project Information (continued)

Project	Project Number on Figure 2.2-4	New Construction (Square Feet)	Demolition (Square Feet)
North Ramp Infrastructure, ASA Phase 1 (24 hardened aircraft shelters [HAS])	45	--	--
Fighter LO/Composite Repair Facility (two bay HAS)	49	32,390	0
Munitions Trailer Maintenance Shop Mod 51104)	53	5,780	0
Repair D-Loop Taxiway	54	--	--
Fighter Armament Systems Maintenance Shop	55	27,015	0
Aircraft Shelters, Phase 1 (8 aircraft)	57	73,616	0
Fighter Hangar/Squad Operations/Aircraft Maintenance Unit (Relocate HSC-25	44	173,713	0
Fighter Wash Rack (Mod to HAS)	47	6,869	0
Fighter Taxiway Network - HAS Phase 1	52	1,125,018	0
Aircraft Shelters, Phase 2 (6 Aircraft)	58	55,212	0
Repair Taxiway Echo	19	--	--
Repair South Runway, Phase 2	34	--	--
Sports Field Complex	38	--	--
Fighter Arm/Disarm Pads/End of Runway Shelter	51	590,193	0
Fighter Fuel Systems Maintenance (Mod to HAS)	56	13,225	0
Aircraft Shelters, Phase 3 (8 Aircraft)	59	73,616	0
Fighter Taxiway Network - HAS Phase 2	60	1,125,018	0
North Ramp Infrastructure, HAS Phase 2 (48 HAS)	61	--	--
Fighter Squadron Operations/Aircraft Maintenance Unit	62	18,622	0
Aircraft Shelters, Phase 4 (8 Aircraft)	63	73,616	0
Visiting Quarters (200 rooms)	65	132,912	0
Flight Kitchen	24	2,002	0
Aircraft Shelters, Phase 5 (8 Aircraft)	64	73,616	0
Visiting Quarters (200 rooms)	66	106,000	0
High School	29	50,000	0
Aircraft Shelters, Phase 6 (8 Aircraft)	67	73,616	0
Global Hawk Wheel and Tire Shop	2	6,437	TBD
Global Hawk Electro-environmental Shop	3	1,195*	TBD
Mooring and Grounding Points	10	--	--
Run Up Pads	11	9,603	0
Modernize Flightline Perimeter	13	--	--
Alter Maintenance Back Shops	16	0	0
Renovate 225 Family Housing Units	39	--	--
Construct 190 Family Housing Units	40	--	--

Table 2.2-8 Proposed Forest Habitat Clearing

Project Area Name	Cleared Area (hectares)
ASA (including perimeter road)	66.4
Commercial Gate Project Entry Gate	3.5
Commercial Gate Project Road	0.0
Commercial Gate Project Truck Inspection Facility	4.0
Total	73.9

An Entry Gate would be constructed along Route 9 to allow for commercial and contractor vehicles to enter the Base on the west side of Andersen main. This facility would require a paved entry with gate, security fence, and small facility for security personnel. This facility is shown in Figure 2.2-6. The amount of area that would be cleared for the Entry Gate equates to 3.5 hectares (8.6 acres).

A Truck Inspection Facility would be constructed east of the Entry Gate for the purpose of inspecting vehicles and material delivered to the Base. The Truck Inspection Facility is shown on Figure 2.2-6. The amount of area that would be cleared for the Truck Inspection Facility equates to 4.0 hectares (10 acres).

The existing road between the sites for the Entry Gate and the Truck Inspection Facility would be repaved to a width of 7.3 meters (24 feet) with 1-meter shoulders on each side, for a total width of 9.3 meters (30.5 feet). Because the existing road corridor can accommodate proposed road modifications, vegetation clearing within the existing road corridor would be minimal and limited to removal of herbaceous or shrubby vegetation. Street lights would be installed along the road between the Entry Gate and the Truck Inspection Facility. The street lights would be illuminated only when the Commercial Gate is in operation.

Aircraft Wash Racks and Clear Water Rinse Facility. As indicated in Table 2.2-7, aircraft wash rack and clear water rinse facilities would be constructed and operated to support ISR/Strike operations. Wastewater from the facilities would be discharged to the Base wastewater collection system. The facilities would be constructed with environmental controls to remove contaminants from the wash water before entering the wastewater collection system. Table 2.2-9 lists the number of aircraft that would be washed annually at the wash rack facilities (one on the south ramp for large aircraft and one on the north ramp for fighter aircraft) and the gallons of water that would be used for each aircraft washing. The table also lists the number of aircraft that would pass through the clear water rinse facility and the number of gallons used for each aircraft rinse.

Table 2.2-9 Aircraft Wash Rack and Aircraft Clear Water Rinse Facility Information for ISR/Strike Aircraft

Aircraft Type	Number of Aircraft Washed/Rinsed per Year	Gallons of Water per Aircraft Wash/Rinse
Aircraft Washracks		
F-22	115	250
F-15E	29	250
KC-135	18	500
Global Hawk	36	250
B-1	36	2,000
B-2	12	2,000
B-52	18	2,000
Clear Water Rinse Facility		
F-22	230	1,000
F-15E	58	1,000
KC-135	36	1,000
Global Hawk	72	1,000
B-1	72	1,000
B-2	24	1,000
B-52	36	1,000

Source: Sherrill 2005.

Corrosion Control Hangar. As indicated in Table 2.2-7, a corrosion control hangar would be constructed and operated to support ISR/Strike operations. The hangar would be constructed in accordance with directives for corrosion control facilities to provide the required emissions controls and safety for personnel. The hangar would have systems that filter particulate matter. The following describes the planned activities at the corrosion control hangar.

- An entire aircraft would not be painted at Andersen AFB and painting would be limited to touchup.
- Annual primer use would be about 40 and 120 gallons, respectively, for aircraft and aerospace ground equipment (AGE).
- Annual paint use would be about 40 and 120 gallons, respectively, for aircraft and AGE.
- Paint would be removed from aircraft and AGE surfaces by hand sanding.
- The largest panel that would be painted for any aircraft would be about 200 square feet, and the smallest could be less than 1 square foot.

Fuel Cell Maintenance Hangar. As indicated in Table 2.2-7, a fuel cell maintenance hangar would be constructed and operated to support ISR/Strike operations. The hangar would be constructed in accordance with directives for fuel cell maintenance facilities to provide the required emissions controls and safety for personnel. A trench would be installed to capture fire fighting foam along with a collection point for the fire suppression water should foam and water be discharged in the event of a fire. The water would be treated and metered into the wastewater

collection system. The following describes the planned activities at the fuel cell maintenance hangar.

- 72 B-52 fuel tanks would be entered and each tank would be open 4 days.
- 53 B-1 and B-2 fuel tanks would be entered and each tank would be open 1 day.
- 104 KC-135 fuel tanks would be entered and each tank would be open 2 days.

Dormitory Construction and Military Family Housing Renovation and Construction.

The housing projects would occur on a phased schedule that mirrors the increases in the number of personnel.

2.2.1.2 Conservation Measures

As defined in the Endangered Species Consultation Handbook for Section 7 consultation, conservation measures are actions to benefit or promote recovery of listed species included by the federal agency as an integral part of the proposed action. These actions are taken by the federal agency and serve to minimize or compensate for project effects on the species under review. These may include actions taken prior to the initiation of consultation or actions which the federal agency have committed to complete in a BA or similar document (USFWS 1998).

The conservation measures developed by the Air Force and described in this subchapter are designed to compensate and minimize the potential impacts from implementation and operation of the ISR/Strike action to threatened and endangered (T&E) species resulting from Alternative A, specifically the Mariana fruit bat (*Pteropus mariannus mariannus*), Mariana crow (*Corvus kubaryi*), Micronesian kingfisher (*Halcyon cinnamomina cinnamomina*), and the Guam rail (*Rallus owstoni*). (The conservation measures also are included in the BA the Air Force completed for the ISR/Strike proposal and contained in Appendix E.) The conservation measures, as components of Alternative A, correspond to recovery actions outlined in various USFWS recovery plans. Overall goals of the conservation measures contribute to important habitat and species management objectives on Guam, including BTS management and removal, habitat restoration and protection, feral ungulate impact reduction, and research. All conservation measures that involve activities on the Refuge Overlay unit would be coordinated with GNRW staff.

Draft EIS Comment: We understand that the construction footprint has already been altered to reduce clearance in intact forest (p. 2-28). We are confident Air Force planners have the skill to further adjust the footprint to protect the patches of higher quality habitat (totaling 3.5 acres), and to realign the road from a perimeter concept to one within the area already to be cleared for the ASA.

Response: Based on the process described in the Adjustment of the Construction Footprint conservation measure in Subchapter 2.2.1.2, further adjustment is not possible due to the facility requirements for the ASA. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."

Adjustment of the Construction Footprint

The construction footprint of the ASA, as shown in Figure 2.2-5, was altered from the first proposed design to reduce clearing within areas of relatively intact secondary forest. Similarly, the initially planned location for construction of military family housing units was relocated to a previously developed site on the golf course after a reconnaissance survey involving Air Force and DAWR staff in June 2005. This action avoided constructing the units on approximately 26 hectares (65 acres) of primary and intact secondary limestone forest.

Wildlife Management Specialist

Andersen AFB proposes to employ a full-time Wildlife Management Specialist who would also contribute to many of the conservation measures included in the proposed action. This new position would supplement the current Base natural resource staff. The Wildlife Management Specialist would report to the Chief of Conservation Resources who would provide oversight and administrative support. This would allow the Wildlife Management Specialist to fulfill specified job duties, supported by numerous volunteer conservation officers. Details associated with the duties, goals, control methods, and results tracking for the Wildlife Management Specialist would be developed in conjunction with the next revision of the Andersen AFB Integrated Natural Resources Management Plan. A preliminary list of key duties of this position includes:

- **Conducting and managing depredation hunts within ungulate exclosure areas.** Exclosure fencing construction would be in tandem with depredation hunts within proposed exclosure fencing (see Ungulate Exclosure Fencing in this subchapter). Time-critical goals for eradication of deer and feral pigs within these areas would be outlined in a multi-year ungulate management plan (see Ungulate Planning and Research in this subchapter). The Wildlife Management Specialist would be responsible for organizing depredation hunts in partnership with Andersen AFB conservation officers.
- **Recording information on ungulate kills.** Measurements would be obtained from ungulate carcasses. These metrics would include sex of the kill, teeth measurements appropriate for age determination, and cranium size, and would be made available to research specialists (see Ungulate Planning and Research in this subchapter).
- **Trapping of exotic predators.** The Wildlife Management Specialist would also be responsible for deployment and maintenance of traps designed for rodents, feral cats, and feral dogs. Ungulate exclosure areas would be prioritized for trapping.
- **Fenceline reconnaissance for maintenance.** During typhoon events in Northern Guam, intense and sustained wind speeds pose a significant maintenance concern for proposed exclosure fencing. A breach in a fenceline would present an opportunity for re-invasion of unwanted species. In addition to routine monitoring of the fenceline (through pedestrian surveys), fenceline inspection would be conducted by the Wildlife Management Specialist after episodic typhoon events.
- **Coordination with resource agencies.** The Wildlife Management Specialist would coordinate management activities with the appropriate cooperating resource agencies, such as USFWS, U.S. Department of Agriculture (USDA), and GovGuam Division of Aquatic and Wildlife Resources (DAWR).

Ungulate Exclosure Fencing

To offset the loss of habitat from clearing and aircraft operations associated with the proposed action, two units totaling approximately 200 hectares (494 acres) would be fenced to prevent incursion of deer and pigs. A depredation program would be managed by the Wildlife Management Specialist within exclosure areas. The intent of exclosure fencing is to facilitate forest regeneration without the presence of ungulate pressure, so emergent canopy species may be replaced by saplings. Figure 2.2-7 shows the location of two proposed exclosure areas in the Guam Natural Wildlife Refuge (GNWR) overlay, both near Ritidian Point and adjacent to the

Ritidian Point unit. The Ritidian West Unit would fence 90 hectares (222 acres), while the Ritidian East Unit would fence 110 hectares (271.8 acres). This proposed enclosure area would occupy land designated by the USFWS as “Priority 1” for recovery of the Mariana crow (USFWS 2005b). Final placement of the enclosure units would be coordinated with GNWR, USFWS, and DAWR. Further, the Andersen AFB General Plan would be modified to include a special conservation designation for the enclosure areas after the units are finalized.

Existing roads, existing and/or previous fencelines, and cleared/previously cleared areas were considered when proposing the location of fencelines for the enclosure areas. Assuming that cliff lines can serve as effective barriers to ungulate entry, cliff lines would not be fenced. Leveraging cliff lines as barriers would reduce forest clearing and disturbance necessary for fence construction. The proposed enclosure fencing would involve construction of 3,400 meters (11,155 feet) of fenceline, using suitable posts and fencing material sufficient to prevent ungulate incursion and to withstand Guam’s environmental conditions (e.g., sea spray, high winds, humidity). Construction would require removal of vegetation along 310 meters (1,117 feet) of fenceline, which amounts to 0.1 hectare (assuming a 3-meter buffer along the fenceline to allow for construction access). The remaining 3,090 meters (10,138 feet) of fenceline are along roads and through herbaceous areas, requiring little or no clearing. Approximately 1,600 meters (5,249 feet) of fenceline would be shared with ungulate enclosure fencing included in the proposed actions associated with Northwest Field. Fenceline routes would be surveyed prior to fence construction to plan for minor adjustments and construction planning.

Maintenance inspections of the fenceline would occur on a quarterly basis, as well as after episodic typhoon events. Fenceline breaks and preventative maintenance needs would be logged during the inspections, and maintenance activities would be planned accordingly.

Inspections of the fenceline would be assigned to the proposed Wildlife Management Specialist. As discussed in Subchapter 1.2.5, clearing and grading would require Guam EPA permits as well as an EPP.

Ungulate Planning and Research

Impacts of high ungulate densities in northern Guam’s limestone forest have been well documented (Morton, *et al.* 2000; Perry and Morton 1999; Schreiner 1997; Wiles 2005). Efforts to manage and control populations of ungulates include:

Development of an Ungulate Control Plan. Coordination with resource agencies such as USFWS and DAWR would be sought to develop a multi-year ungulate control plan. The plan would be designed to guide the proposed Wildlife Management Specialist, Andersen AFB conservation officers, and other management stakeholders in efforts to eradicate deer and pigs within the ungulate enclosure area, and to reduce ungulate densities in non-fenced areas. Control and monitoring techniques would be clearly defined in the ungulate control plan.

- ***Facilitation of Research.*** The USFWS identified the need for ungulate movement studies to enhance current and future management strategies. Typically, these movement studies involve radio telemetry techniques and would be suitable for academic publication. The proposed Wildlife Management Specialist would provide technical support for such research activities, including anesthetizing deer and pigs for radio tagging. The proposed Wildlife Management Specialist may also provide

technical assistance for dressing of carcasses for stomach content analysis or wildlife disease studies.

Transplanting of *Tabernaemontana rotensis* Seedlings and Saplings

There are at least 15 locations containing approximately 1,000 *T. rotensis* trees within the ISR/Strike area. The majority of the trees are seedlings or saplings and the remaining are mature trees. *T. rotensis* saplings respond well to transplanting. A landscaping crew can remove the saplings and transplant them outside the project area(s). At the same time, a landscaping crew can collect *T. rotensis* seeds for outplanting outside the project area. This would offset removal of *T. rotensis* individuals during construction operations within the project areas.

Outplanting of Foraging Trees Important to Mariana Fruit Bat and Mariana Crow

This conservation measure would contribute to existing foraging habitat with native trees important to the Mariana fruit bat and Mariana crow. Foraging plots are an accepted tool for repairing damaged wildland areas, namely because attractant plants will spread propagules. The goal of this conservation measure is to increase the attractiveness of habitat outside ISR/Strike project areas by establishing foraging plots within ungulate exclosures. Establishment of foraging plots would include:

- Five 50-meter by 50-meter foraging plots (Figure 2.2-7). A finalized list of tree species would be dependent on commercial nursery or herbarium stocks, and would involve coordination with USFWS, DAWR forestry personnel, University of Guam herbarium personnel, and the USDA Natural Resources Conservation Service field office;
- Supplemental protective fencing to prevent browse pressure within foraging plots; and
- Management actions within these plots to include herbaceous vegetation control, fenceline maintenance, and quarterly monitoring of outplanting success.

Foraging plots as part of the proposed action associated with the ISR/Strike capability would be additional to foraging plots as part of the proposed actions associated with Northwest Field projects (see Subchapter 2.4.2.2).

Vegetation Surveys Relevant to Recovery of Mariana Fruit Bat and Mariana Crow

The limestone forest of northern Guam is not homogeneous in composition or structure. Quantification of the vegetation community types that cover Andersen AFB can aid in the proper allocation of resources for species management. Vegetation surveys of habitat areas for the Mariana fruit bat and Mariana crow would be conducted as part of the proposed action to target management resources for species recovery. These surveys would include:

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- **Vegetation assessment of occupied habitats of the Mariana fruit bat.** The vegetation community composition and structure would be described and mapped as part of this vegetation assessment. Goals of these efforts include assessment of locations for possible reestablishment attempts and detection of invasive herbaceous and woody species in essential habitat area. The vegetation survey would be conducted throughout the entire area of Andersen AFB, excluding Andersen South.

This vegetation assessment corresponds to Recovery Actions 2.1.2 and 3.1.1.2 of the USFWS Recovery Plan for the Mariana fruit bat (USFWS 1990b). A scope of work would be developed in cooperation with USFWS and DAWR. Modifications to the survey objectives would be concurrent with anticipated results from new research (Brooke 2005; Janeke 2005), as well as updates to recovery plans.

- **Vegetation assessment of areas important to the Mariana crow.** Goals of this vegetation assessment would include determination of vegetation elements in need of management treatments within current and potential utilization areas of the Mariana crow.

This vegetation assessment corresponds with Recovery Action 2.3.4 of the USFWS Recovery Plan for the Mariana crow (USFWS 2005b). A scope of work would be developed in cooperation with USFWS and DAWR to ensure that deliverables have maximum value to recovery efforts and can be integrated into existing data collection programs.

- **Base-wide inventories of trees of value to the Mariana fruit bat, Mariana crow, and Micronesian kingfisher.**

Ongoing surveys for *T. rotensis* and *Cycas circinalis* may provide a template for the inventory of rare trees of value to listed species. Rare tree inventories would be conducted for *Pisonia grandis*, *Heritiera longipetiolata*, *Serianthes nelsonii*, *Artocarpus mariannensis*, and/or *Elaeocarpus joga*. Surveys for all these species can be conducted concurrently and could use the existing transects used in the *T. rotensis* surveys. These surveys would provide resource managers with additional information about the relative scarcity of some species that may be important to the Mariana fruit bat, Mariana crow, and Micronesian kingfisher.

The rare tree inventories contribute to recovery actions associated with vegetation assessments and baseline habitat studies for the Mariana fruit bat, Mariana crow, and Micronesian kingfisher. Specifically for *S. nelsonii*, rare tree inventories correspond to Recovery Actions 1.1.1.1 and 1.3.1 of the USFWS Recovery Plan for *S. nelsonii* (USFWS 1994), which concern identification and inventory of newly discovered individual trees. Cooperation with USFWS and DAWR forestry personnel would be sought in developing the scope of work for these rare tree inventories.

Draft EIS Comment: The final EIS should include further assurances that reintroduction of endangered species to native habitat will not be impeded by the proposed action.

Response: Implementation of the conservation measures described in Subchapter 2.2.1.2 would reverse the continued degradation of important habitat, and therefore, contribute to the recovery actions associated with the reintroduction of listed species. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no Implementation of the conservation measures described in Subchapter 2.2.1.2 would reverse the continued degradation of important habitat, and therefore, contribute to the recovery actions associated with the reintroduction of listed species. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force." measures built into the project by the Air Force."

Noise Study

Aircraft noise has the potential for effects to the Mariana fruit bat and the Mariana crow. A field study was conducted from October 1992 to September 1995 to assess the potential effects of aircraft overflights on the Mariana fruit bat and Mariana crow resulting from aircraft operations at Andersen AFB (Morton 1996). The types of aircraft and the level of aircraft operations expected under the ISR/Strike capability would be different than those that occurred at the Base under the Morton (1996) study. Therefore, the data and results of the Morton study may not apply to the ISR/Strike aircraft operations condition. Surveys similar to those performed by Morton (1996) would be done prior to and during incremental increases of additional overflights at Andersen AFB. The noise study would focus on Mariana fruit bats near the main colony at Pati Point and the Mariana crow in the area north of the airfield. Supplemental to field measurements of noise, surveys of reproductive success and predator pressures would be accomplished concurrently with the noise studies. Development of a scope of work and survey methods would be a cooperative effort with USFWS and DAWR. Replication of the Morton (1996) study would not be possible because the current mix of aircraft operating at Andersen AFB differs from when Morton collected data. In addition, procedural standards for acoustical studies have progressed since Morton's study. To be in line with current standards, enhancements to Morton's methods would include:

- **Sound level meter.** Morton used a class III Radioshack™ digital sound level meter which is not typically used in current acoustical studies. The American National Standard for sound level meters recommends the use of class I sound level meters. (ANSI S1.4-1983 [R 2001]).
- **Sound level meter height.** The recommended meter height for similar acoustical studies is 1.5 meters (5 feet). The sound level meter height in the Morton study was 50 centimeters (20 inches). The recommended height of 1.5 meters (5 feet) avoids ground reflectivity of sound (American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound Part 1: ANSI S12.9-1988, Part 2: S12.9-1992, and Part 3: ANSI S12.9-1003).
- **Aircraft altitude measuring.** Aircraft altitude was estimated in the Morton study. The new studies would use ground track data to supplement field estimations of aircraft altitude.

Environmental Education and Awareness Information

Incoming military personnel would receive education in the identification, behavior, and habits of the BTS. BTS inspection and interdiction issues and procedures would be monitored by the Base Environment, Safety, and Occupational Health Council to ensure that the USDA accomplishes inspection of departing aircraft and cargo in accordance with the 36th Wing Instruction 32-7004, *Brown Tree Snake Management* (36 WI 32-7004).

Encouragement of Mariana Fruit Bat Pup Recruitment at Pati Point Colony

A recent census of Mariana fruit bat populations at the Pati Point colony reported less than 30 mature individuals and a complete lack of fruit bat pups (Dicke 2006). The population of Mariana fruit bats in northern Guam may number approximately 100 individual adults when considering bats that are not associated with colonial roosting. Predation by the BTS on fruit bat

pups is believed to be the primary factor for the absence of young individuals. This conservation measure proposes to trap or bait BTSs at the Pati Point Colony, or apply other treatments to reduce BTS numbers, thereby reducing the threat posed to Mariana fruit bat pups by BTS predation.

The USDA Denver Wildlife Research Center began an ongoing program for BTS control technologies in 1994. The program continues to evaluate and improve BTS control products including toxicants, repellants, fumigants, sterilants, attractants, artificial baits, and aerial delivery of control products. The DoD funds a significant portion of this applied research. Cooperation with various resource agencies would be sought to determine the most appropriate method of BTS control in the Pati Point Colony vicinity.

Brown Tree Snake Interdiction and Control

Brown tree snake control is a priority for the DoD (Kreig 2005). The procedures in the 36 WI 32-7004 ensure that 100 percent of out-bound craft (air and water) from Andersen AFB is inspected (USAF 2006). The Instruction implements and builds on prior related plans and complements the “Brown Tree Snake Control and Eradication Act of 2004.” A copy of the Instruction is contained in Appendix C of the BA (see Appendix E). 36 WI 32-7004 states, *All shipments by air or sea of material originating from Andersen AFB facilities for military exercise support, day-to-day military cargo and equipment and private contractors will be inspected by USDA WS personnel and/or their trained snake detection canines and properly document the inspection before transport off-island. All aircraft, military or civilian, taking off from Andersen AFB will be inspected by USDA WS to the maximum extent possible.* Under the 36 WI 32-7004, the USDA notifies the Air Terminal Operations Center that the aircraft has been inspected, and the aircraft are marked off electronically in an Access database. The Air force has initiated the internal process to provide a 5-year agreement with USDA WS for the use of Building 22002 on Andersen main. This agreement will provide enhanced infrastructure stability for the BTS interdiction program.

Adaptive Management and Ground Track Modification

Habituation of Mariana fruit bats to noise is suspected (Janeke 2005); however, the degree of habituation represents a data gap in the current literature. A similar data gap exists for habituation of Mariana crows to aircraft noise (40 CFR Part 1502.22).

This conservation measure would use data from the proposed noise studies (see Noise Study in this subchapter) to adjust the aircraft ground track location and flight profile (*i.e.*, airspeed, altitude, and/or power setting) to evaluate if changing the ground track location and flight profile would minimize impacts to Mariana fruit bats or whether habituation is likely to occur resulting in very little negative impact on this species. Changes could be made in the flight profile provided the change would not constitute a flight hazard or noncompliance with the aircraft flight manual. As aircraft overflights increase, management recommendations would be submitted to modify existing flight tracks and profiles (40 CFR Part 1508.20).

Adaptive management is a process that allows for development and implementation of natural resource management strategies in response to a degree of biological uncertainty. Under adaptive management, land managers use models of natural resource systems to develop performance measurements and initial policy choices, that incorporate into the regulatory

implementation framework a process for continuous monitoring, evaluation, and adjustment of decisions and practices (Ruhl 2004; Nagel, *et al.* 2002). Adaptive management is considered a component concept of ecosystem management, which has become the dominant model of regulatory practice for Integrated Natural Resource Management Plan (INRMP) implementation on military lands. Adaptive management involves two basic tenets:

- A commitment to a continual learning process, a reiterative evaluation of goals and approaches, and redirection based on an increased information base (Baskerville 1985); and
- Explicit hypotheses regarding ecological structure, function, and anticipated response of variables within an ecosystem (Holling 1978; Walters 1986).

Frequent aircraft noise may be an external source that might affect components within the ecosystem. Monitoring of key components within the ecosystem as an adaptive management approach may allow changes to be made in the external source to support the overall health of the ecosystem or minimize noise impacts.

As noise studies progress, an adaptive management working group chaired by the Andersen AFB Natural Resource Planner and consisting of representatives from DAWR, USFWS GNWR, and USFWS Ecological Services would meet periodically with special meetings in response to typhoon events, aircraft accidents, or Mariana fruit bat colony abandonment. The adaptive management working group would develop the strategy for this conservation measure. Successful implementation of adaptive management will be dependent on receiving and evaluating new information (Ringold 1996), as it becomes available, from noise studies and other continuous studies conducted by researchers and resource agencies. Future updates of the Andersen AFB INRMP would include useful information gained from this adaptive management strategy.

2.2.2 Description of Alternative B

At full implementation and operation, the ISR/Strike capability under Alternative B would base four Global Hawks and associated personnel at Andersen AFB and rotate as many as 48 fighter (F-22 and F-15E), 12 KC-135 tanker, and 6 bomber (B-1, B-2, and B-52) aircraft and personnel from bases within the 50 states. These 70 aircraft, when added to the 14 HSC-25 helicopters currently based at Andersen AFB, would increase the number of based and rotational aircraft to as many as 84. The rotational period for aircraft and personnel would be 120 days.

Table 2.2 -10 presents the time periods for each operational phase and summarizes the number of aircraft by aircraft type and the personnel changes for the operational phases. The Base population could increase to as many as 7,750 personnel when the 1,850 additional personnel associated with Alternative B would be added to the current population of 5,900 persons. The 1,850 personnel include military, Air Force civilian, contractor, and dependent personnel.

Table 2.2-10 Aircraft and Personnel Associated with Alternative B

	Phase			
	Phase 0	Phase 1	Phase 2	Phase 3
Number of Aircraft				
Based				
Global Hawk	4	4	4	4
Rotational				
Fighter	12	24	24	48
Tanker	6	12	12	12
Bomber	6	6	6	6
Total	28	46	46	70
Number of Personnel				
Permanent				
Global Hawk	50	50	50	50
Support	50	50	50	50
Subtotal	100	100	100	100
Rotational				
Fighter	300	500	500	900
Tanker	250	400	400	400
Bomber	350	350	350	350
Subtotal	900	1,250	1,250	1,650
Total	1,000	1,350	1,350	1,750
Number of Permanent Personnel Accompanied by Dependents, not Accompanied by Dependents, and Dependents				
Unaccompanied	50	50	50	50
Accompanied	50	50	50	50
Dependents	100	100	100	100
Summary of Additional Personnel Resulting from Alternative B				
Permanent	100	100	100	100
Rotational	900	1,250	1,250	1,650
Dependents	100	100	100	100
Total	1,100	1,450	1,450	1,850
Resulting Base Population by Combining the Alternative B Population with Current Base Population				
Alternative B	1,100	1,450	1,450	1,850
Current Population	5,900	5,900	5,900	5,900
Total	7,000	7,350	7,350	7,750

Note: Three of the Global Hawk aircraft would be PAA, and one aircraft would be BAI. The data in the Number of Personnel section of the table reflect military, Air Force civilian, and contractor personnel. Number of dependents is based on an average of 2.5 dependents per accompanied individual and is rounded to the nearest 50. The number of fighter, tanker, and bomber aircraft reflect an "as many as" condition.

Airfield Operations

Table 2.2-11 lists the projected annual and average daily airfield operations for the ISR/Strike aircraft at Andersen AFB under Alternative B, and reflects the total recurring airfield operations condition after establishment of the ISR/Strike capability. Operations for the ISR/Strike aircraft include mission arrivals and departures as well as training sortie arrivals and departures, and closed pattern operations. The following paragraphs describe mission and training sorties for each ISR/Strike aircraft type that would be at Andersen AFB under Alternative B.

Fighter. As with Alternative A, the fighter element of the ISR/Strike capability under Alternative B would be accomplished by the same numbers of rotational F-22 and F-15E aircraft. The description of flying activities for fighters in Alternative A in Subchapter 2.2.1 applies to Alternative B because the sortie number and sortie profile information are the same for both alternatives.

Tanker. Rotational KC-135 aircrews would fly four sorties per day, 240 days per year from Andersen AFB, the same as Alternative A. A typical sortie would include a departure from the Base, aerial refueling of receiver aircraft, and an arrival at Andersen AFB. However, the flying training would be less under Alternative B because aircrews would accomplish the training events necessary to stay mission ready throughout the rotational period prior to departing their home base. Therefore, approximately 30 minutes of instrument approach and closed pattern training would be accomplished at the Base after arrival and before termination instead of the 60 to 90 minutes associated with Alternative A. It is estimated that about 13 percent of the airfield operations for the tankers would occur during nighttime.

Table 2.2-11 Alternative B Annual and Average Daily Airfield Operations

Aircraft	Arrival and Departure Operations		Closed Pattern Operations		Total Operations	
	Annual	Avg. Daily	Annual	Avg. Daily	Annual	Avg. Daily
ISR/Strike Aircraft						
Fighter						
F-22	5,530	23.04	16,589	69.12	22,119	92.16
F-15E	1,382	5.76	4,147	17.28	5,529	23.04
Fighter Subtotal	6,912	28.80	20,736	86.40	27,648	115.20
KC-135	1,920	8.00	1,901	7.92	3,821	15.92
Global Hawk	440	2.00	220	1.00	660	3.00
Bomber						
B-1	432	1.80	864	3.60	1,296	5.40
B-2	96	0.40	192	0.80	288	1.20
B-52	432	1.80	864	3.60	1,296	5.40
Bomber Subtotal	960	4.00	1,920	8.00	38,868	12.00

Table 2.2-11 Alternative B Annual and Average Daily Airfield Operations (continued)

Aircraft	Arrival and Departure Operations		Closed Pattern Operations		Total Operations	
	Annual	Avg. Daily	Annual	Avg. Daily	Annual	Avg. Daily
ISR/Strike Aircraft						
Subtotal ISR/Strike Aircraft	10,232	42.80	24,777	103.32	35,009	146.12
Other Military	25,144	68.88	59,648	163.42	84,792	232.30
Transient Civil	942	2.58	0	0.00	942	2.58
Total	36,318	114.26	84,425	266.74	120,743	381.00

Note: See Table 2.3-1 for detailed transient military and civil aircraft for the baseline condition. Fighter, tanker, and bomber operations are based on 240 days per year of operations and the Global Hawk operations are based on 220 days per year. The ISR/Strike operations represent the operations associated with as many as 48 fighter, 12 KC-135, and six bomber aircraft.

Unmanned Aerial Vehicle. As with Alternative A, the Global Hawks associated with the ISR/Strike capability under Alternative B would be permanently based. The description of flying activities for Global Hawks in Alternative A in Subchapter 2.2.1 applies to Alternative B because the sortie number and sortie profile information are the same for both alternatives.

Bomber. As with Alternative A, the bomber element of the ISR/Strike capability under Alternative B would be accomplished by rotational B-1, B-2, and B-52 aircraft. The description of flying activities for bombers in Alternative A in Subchapter 2.2.1 applies to Alternative B because the sortie number and sortie profile information are the same for both alternatives.

2.2.2.1 Construction Projects and Facility Operation

Numerous construction and building addition/alteration projects would be constructed over an approximate 16-year period to support establishment and operation of the ISR/Strike capability at Andersen AFB. Many of the projects identified for Alternative A (see Table 2.2-7) would also be constructed for Alternative B. Figure 2.2-4 depicts the proposed locations for the projects. The following Alternative A projects listed on Table 2.2-7 would not be constructed under Alternative B.

- 190 Family Housing Units
- Military Family Housing Office
- Military Family Housing Supply and Storage
- Military Family Housing Warehouse

Facilities Operation

Facilities operations would be the same as that described for Alternative A.

2.2.2.2 Conservation Measures

The conservation measures would be the same as those described for Alternative A.

2.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the ISR/Strike capability would not be established. Andersen AFB would continue as a location from which as many as six bomber aircraft accomplish missions on a rotational basis. Fourteen UH-60 helicopters belonging to HSC-25 would continue to be based at Andersen AFB and accomplish missions from the airfield. The Base also would continue to provide refueling, aircraft maintenance, and air cargo handling for transient military and civil aircraft. Construction projects would be those typically accomplished for individually programmed facility actions and operations and maintenance (O&M) activities.

The number of Air Force active duty and civilian authorizations, as well as contractor personnel at the Base, would remain at approximately the September 2004 levels (*i.e.*, 3,300 personnel) (Andersen AFB 2004a). Total Base population when considering personnel authorizations plus dependents would continue to be about 5,900 persons. Likewise, airfield operations would continue at the 2004 levels of activity. Table 2.3-1 lists the average daily and annual airfield operations for the No Action Alternative (*i.e.*, baseline condition) at Andersen AFB.

2.4 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Complete environmental impact analysis of the No Action and proposed action must consider cumulative impacts due to other actions. A cumulative impact, as defined by the CEQ (40 CFR 1508.7), is the "...impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." Subchapter 1.2.1 discusses the Air Force's request for actions by other DoD and GovGuam agencies that could be considered for cumulative impacts.

Table 2.3-1 Baseline Annual and Average Daily Airfield Operations

Aircraft	Arrival and Departure Operations		Closed Pattern Operations		Total Operations	
	Annual	Avg. Daily	Annual	Avg. Daily	Annual	Avg. Daily
Military						
EA-6	153	0.42	0	0.00	153	0.42
B-1	453	1.24	0	0.00	453	1.24
B-52	569	1.56	0	0.00	569	1.56
C-5	891	2.44	0	0.00	891	2.44
C-9	927	2.54	0	0.00	927	2.54
KC-10	204	0.56	0	0.00	204	0.56
C-12	88	0.24	0	0.00	88	0.24
C-17	314	0.86	0	0.00	314	0.86
C-20	285	0.78	0	0.00	285	0.78
C-21	606	1.66	0	0.00	606	1.66
C-130	1,956	5.36	0	0.00	1,956	5.36

Table 2.3-1 Baseline Annual and Average Daily Airfield Operations (*continued*)

Aircraft	Arrival and Departure Operations		Closed Pattern Operations		Total Operations	
	Annual	Avg. Daily	Annual	Avg. Daily	Annual	Avg. Daily
Military						
KC-135	694	1.90	0	0.00	694	1.90
C-141	197	0.54	0	0.00	197	0.54
E-2	796	2.18	0	0.00	796	2.18
F-15	409	1.12	0	0.00	409	1.12
F-16	380	1.04	0	0.00	380	1.04
F-18	1,000	2.74	0	0.00	1,000	2.74
P-3	650	1.78	0	0.00	650	1.78
CH-46	88	0.24	0	0.00	88	0.24
Ch-53	95	0.26	0	0.00	95	0.26
SK-70	183	0.50	0	0.00	183	0.50
UH-60	14,206	38.92	59,648	163.42	73,854	202.34
Subtotal	25,144	68.88	59,648	163.42	84,792	232.30
Transient Civil Aircraft						
B-747	847	2.32	0	0.00	847	2.32
B-757	95	0.26	0	0.00	95	0.26
Subtotal	942	2.58	0	0.00	942	2.58
Total	26,086	71.46	59,648	163.42	85,734	234.88

Note: Annual operations based on 365 days per year.

Source: AFCEE 2003.

2.4.1 Other Actions Planned for Andersen Main Base

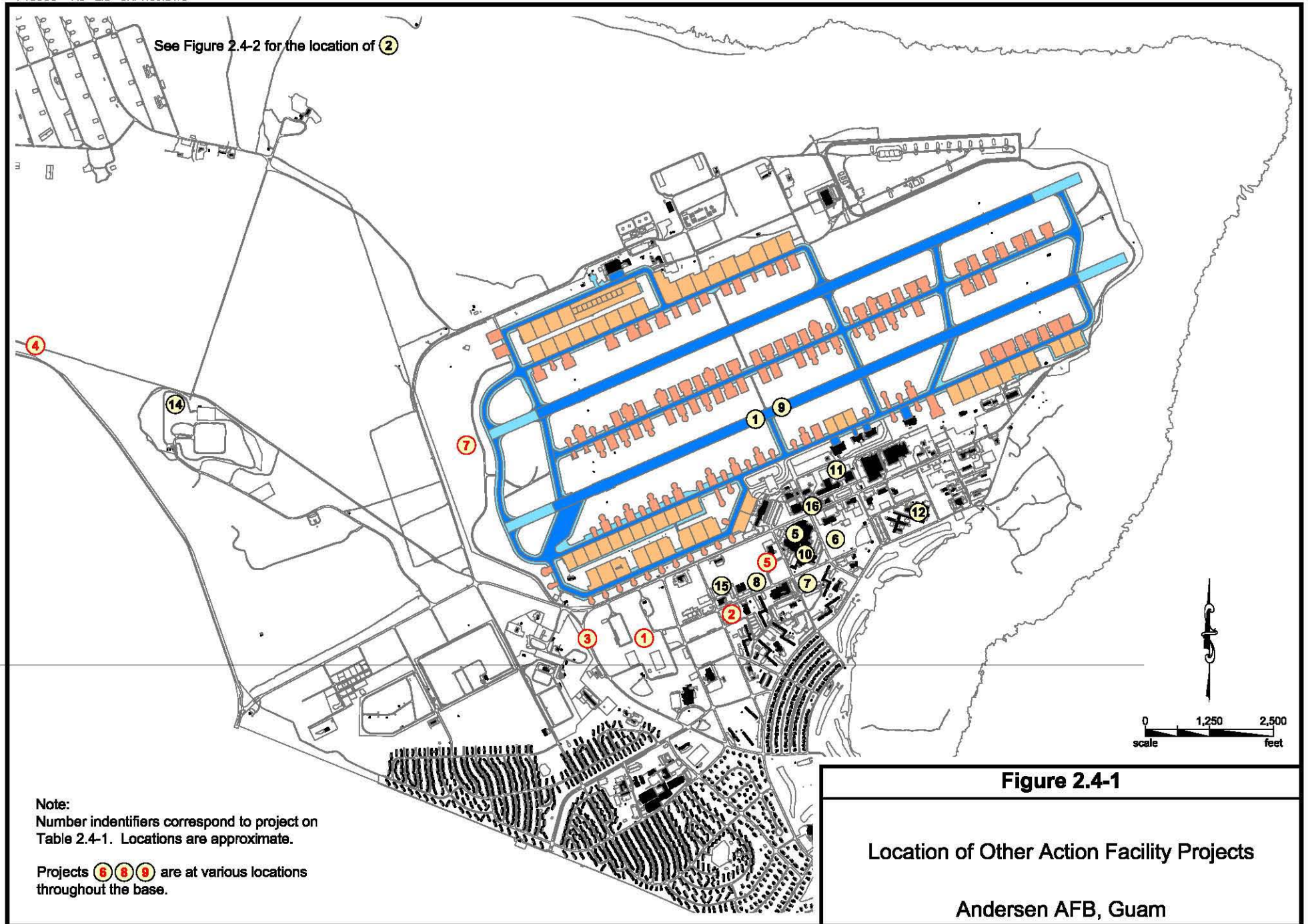
Figure 2.4-1 depicts the locations for the other actions, and Figure 2.4-2 shows Munitions Storage Area (MSA) 1, the location proposed for construction of 60 additional munitions storage igloos. Table 2.4-1 contains information on these other projects. No additional personnel would be assigned to Andersen AFB as a result of these other actions planned by Andersen AFB. Other projects such as the landfill expansion and water system upgrade are currently in progress or would be completed before implementation of the ISR/Strike capability, and are considered in the baseline in this EIS.

The Air Force proposes to initiate construction of 60 additional munitions storage igloos within the existing MSA 1 at Andersen AFB, beginning in FY06. Each new igloo would be approximately 80 feet by 30 feet and covered with soil. No additional personnel would be assigned to Andersen AFB as a result of the project. The Finding of No Significant Impact for the first phase that would construct 12 igloos was signed October 14, 2005.

Table 2.4-1 Other Actions Announced for Andersen Main Base

Project	Color Code and Project Number on Figure 2.4-1	New Construction (Square Feet)	Demolition (Square Feet)	Start Date
Repair AEF FOL south runway, Phase 1	1 black	1,118,500	1,118,500	FY09
Construct munitions igloos	2 black	24,000	0	FY07
Construct AT/FP Perimeter Fence/Road	3 black	54,282	0	FY09
Relocate Main Gate	4 black	4,383	3,617	FY09
Construct War Readiness Materials Storage Warehouse	5 black	2,520	0	FY09
Construct Family Support Complex	6 black	162,600	162,600	TBD
Construct Education/Library Complex	7 black	116,250	116,250	FY09
Construct Consolidated Communications Facility	8 black	47,178	0	FY07
Repair AEF FOL South Runway, Phase 2	9 black	1,118,500	1,118,500	FY12
Construct Base Post Office/Bank Complex	10 black	13,433	0	TBD
Construct Aerospace Ground Equipment Corrosion Control Facility	11 black	--	--	TBD
Construct Civil Engineer Complex	12 black	86,832	TBD	TBD
Construct Combat Arms Training and Maintenance Facility	13 black	9,634	0	TBD
Construct Waste-to-Energy Plant	14 black	--	--	TBD
Construct Consolidated Wing Headquarters	15 black	27,125	0	TBD
Construct Air Traffic Control Tower	16 black	6,662	0	TBD
Extend Chicago Avenue	1 red	--	--	TBD
Relocate Military Clothing Sales	2 red	--	--	TBD
Repair Caroline Avenue	3 red	--	--	TBD
Install Security Lighting, New Commercial Gate	4 red	--	--	TBD
Wing Realignment Renovations	5 red	--	--	TBD
Install Generator (Water Wells)	6 red	--	--	TBD
Replace Short Approach Lighting System with Approach Lighting, 06L	7 red	--	--	TBD
Repair Sewer Lift Stations	8 red	--	--	TBD
Replace Sewer Force Main	9 red	--	--	FY06

Note: Start dates reflected as FY. These are estimated start dates subject to Congressional funding. Due to possible funding shifts, construction could be delayed and the construction time periods could be extended. See Figure 2.4-2 for the location of the Combat Arms Training and Maintenance Facility (project number 13 black).



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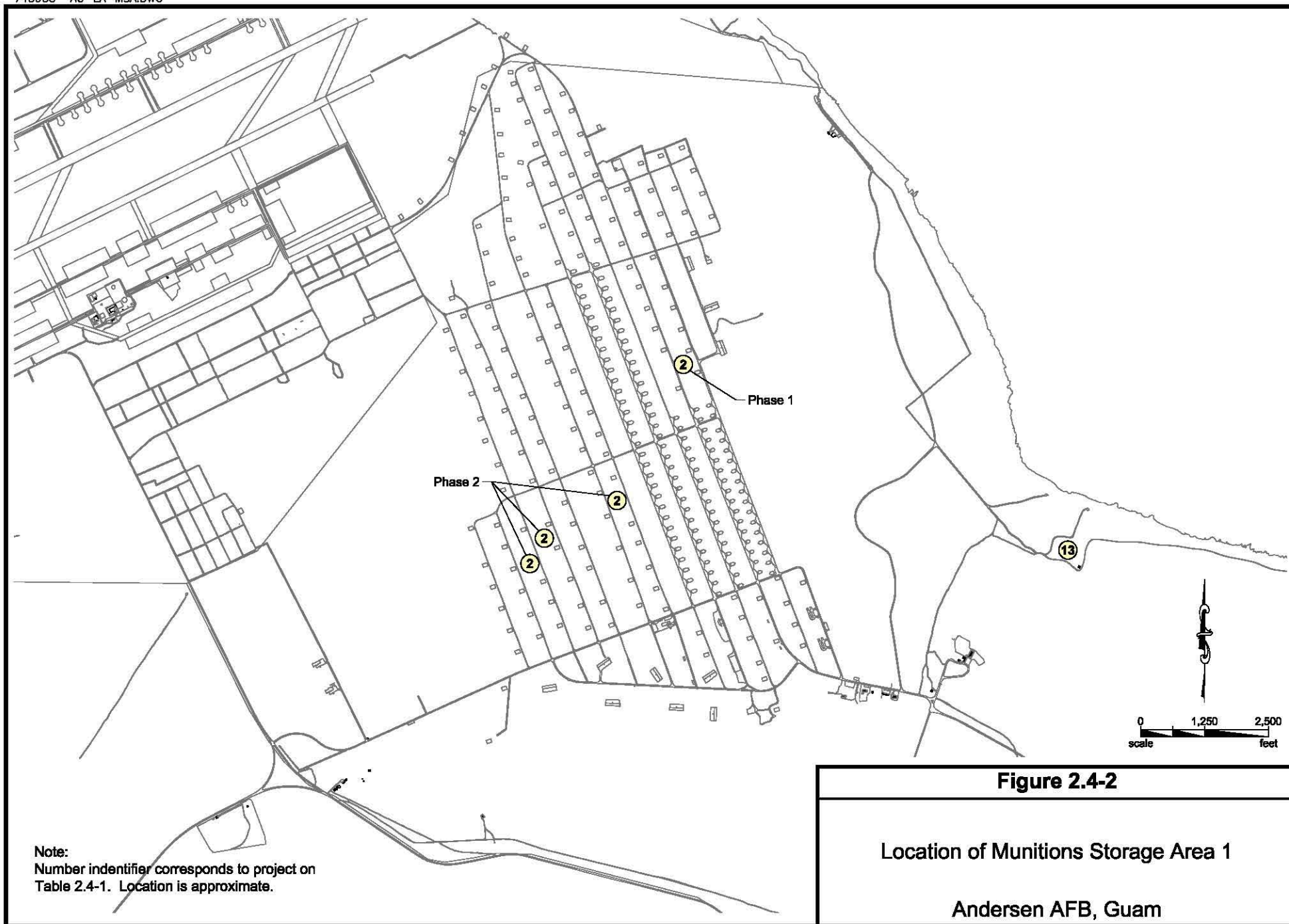


Figure 2.4-2

Location of Munitions Storage Area 1

Andersen AFB, Guam

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2.4.2 Other Actions on the Northwest Field Portion of Andersen AFB

2.4.2.1 Beddown of Training and Support Initiatives at Northwest Field

Another action that would begin before the ISR/Strike project and which would continue during the same time as implementation of the ISR/Strike capability would relocate one of PACAF's Rapid Engineer Deployable Heavy Operational Repair Squadron Engineer (RED HORSE) squadrons, a PACAF Combat Communications squadron, and the Silver Flag, Commando Warrior, and Combat Communications training programs to the Northwest Field area of Andersen AFB. These actions were assessed in an EA entitled *Environmental Assessment Proposed Beddown of Training and Support Initiatives at Northwest Field on Andersen Air Force Base, Guam*. The Finding of No Significant Impact for the action was signed June 20, 2006.

The RED HORSE squadron is restricted to deployment and employment in the country in which it is located. Additionally, the squadron's Silver Flag Training unit is located in another country. The Silver Flag Training unit trains other PACAF engineering squadrons and PACAF services personnel in a 7-day training exercise.

Training for PACAF security forces personnel is accomplished through five training courses that are part of the Commando Warrior training program. Training for PACAF combat communications personnel is conducted by a Combat Communications squadron in a 10-day Combat Communications course at an installation operated by one of the other U.S. military services.

Facility construction, addition, and alteration projects would be required to support relocation of the two squadrons and the three training programs to Northwest Field. Table 2.4-2 lists the type of unit and number of personnel that would be based at Northwest Field, and Table 2.4-3 contains information on the number of students, classes per year, and average number of students per class.

Facility construction projects are planned to begin in FY06 and be completed in FY16. Figure 2.4-3 shows the proposed project areas at Northwest Field and the routes for the respective water, electrical, sanitary sewer, and communications projects. Figure 2.4-4 shows the area of Andersen AFB main in which a dormitory would be constructed. Table 2.4-4 summarizes the amount of new building space, additional impervious cover, and additional area from construction and renovation associated with the Northwest Field action.

Table 2.4-2 Additional Personnel Associated with the Beddown of Training and Support Initiatives at Northwest Field

Unit Name	Number of Personnel
RED HORSE	140
Silver Flag Training	40
Commando Warrior Training	30
Combat Communication	140
Supporting Personnel (Base Operating Support)	30
Total	380

Note: The number in the Number of Personnel column reflects military, Air Force civilian, and contractor personnel. It is estimated approximately 120 of the personnel would not be accompanied by dependents and that 260 personnel would be accompanied by an average of 2.5 per each military, Air Force civilian, and contractor employee, or a total of 650 dependents.

Table 2.4-3 Students Associated with the Beddown of Training and Support Initiatives at Northwest Field

Training Course	Annual Number of Students	Number of Classes per Year	Training Days per Class
Silver Flag and Combat Communications	2,000	15	7
Silver Flag Special Class (GPS, Aircraft Barrier)	500	15	5
Commando Warrior	2,060	24	14-18
Total	4,560	54	--

There would be an average of 135 students per day based on 365 days per year and 4,560 students per year.

Source: PACAF 2005.

Table 2.4-4 Summary of Building Space, Impervious Cover, and Area of Construction and Renovation Associated with Northwest Field Action

Condition	Area in Square Feet
Additional Building Space	476,802
Additional Impervious Cover	1,322,924
Construction and Renovation Area	1,872,838

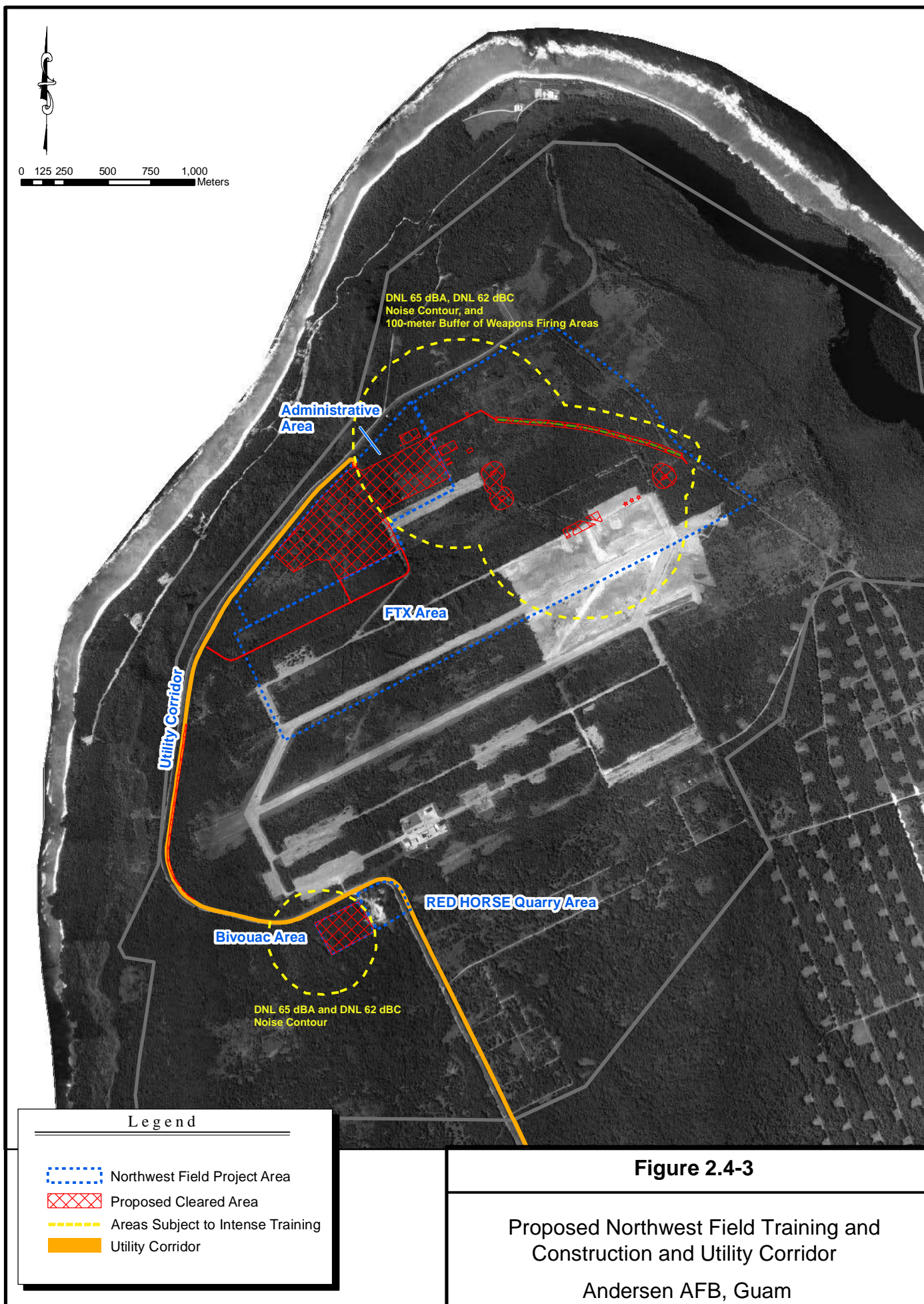


Figure 2.4-3

Proposed Northwest Field Training and Construction and Utility Corridor

Andersen AFB, Guam

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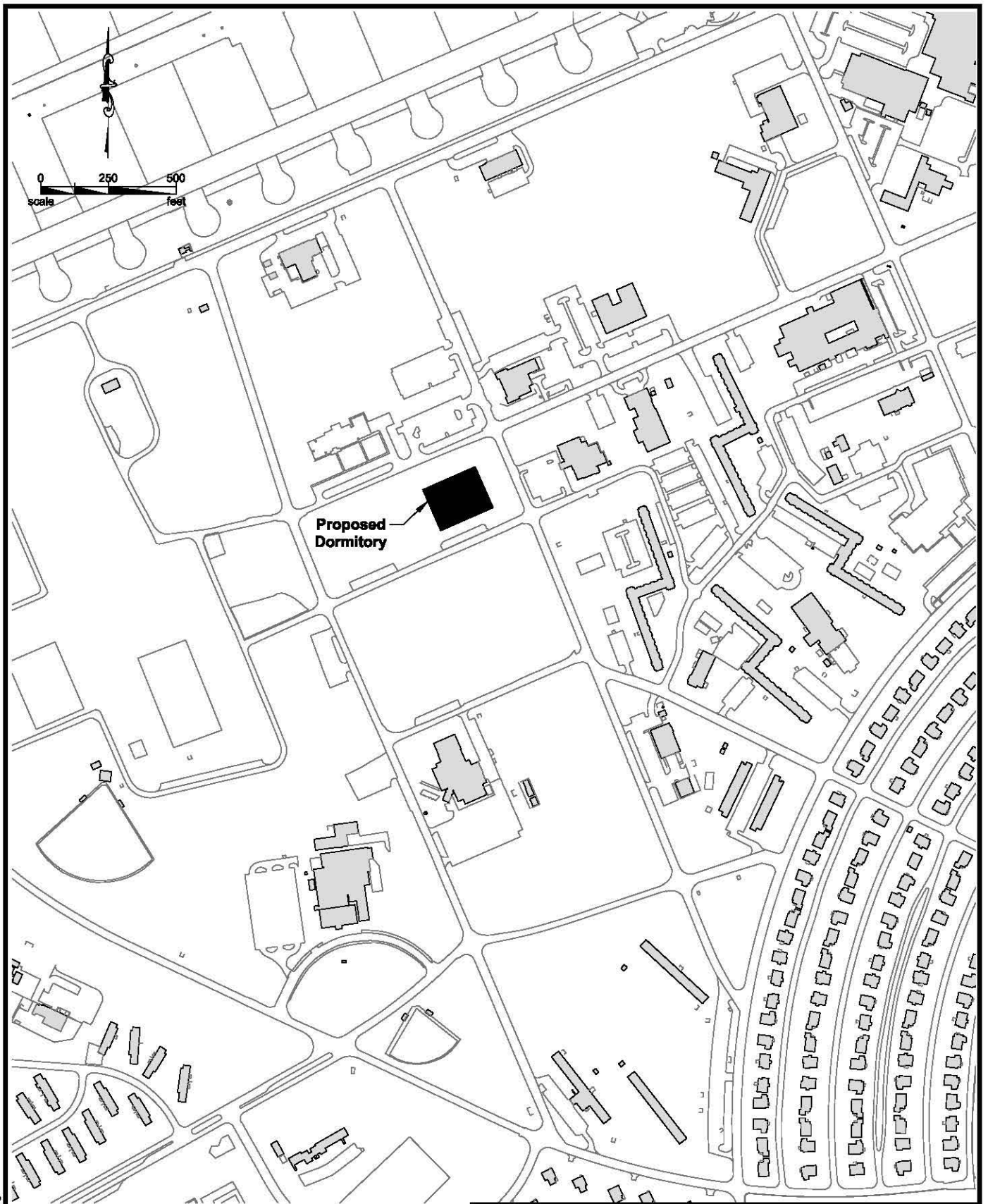


Figure 2.4-4

Potential Location for Dormitory

Andersen AFB, Guam

Note:
Location is approximate.

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2.4.2.2 Conservation Measures

Table 2.4-5 lists the forest habitat that would be cleared for the Northwest Field project infrastructure construction and training area establishment.

Table 2.4-5 Proposed Forest Habitat Clearing for the Northwest Field Project

Cleared Area	Acres	Hectares
Administrative Area	74	29.90
Road Connecting Administrative Area to Route 3A	2	0.90
Utilities Corridor	<1	0.05
Defensive Fighting Position Line	8	3.3
Unpaved Roads Connecting the Ends of the Defensive Fighting Position Line to Existing Roads	1	0.3
Entry Control Points, Base Defense Operations Centers, Sector Command Posts	17	6.83
Bivouac Training Area	15	6.00
Unpaved Road Connecting the Bivouac Training Area to Route 3A	<1	0.03
Total	119	47.31

The Northwest Field conservation measures are designed to be flexible and reduce impacts to T&E species resulting from the Beddown of Training and Support Initiatives at Northwest Field, specifically the Mariana crow, Mariana fruit bat, Guam rail, and the Micronesian kingfisher. The conservation measures, as components of the Northwest Field initiatives, correspond to recovery actions outlined in various USFWS recovery plans. The overall goals of the Northwest Field conservation measures are the same as those for the ISR/Strike project.

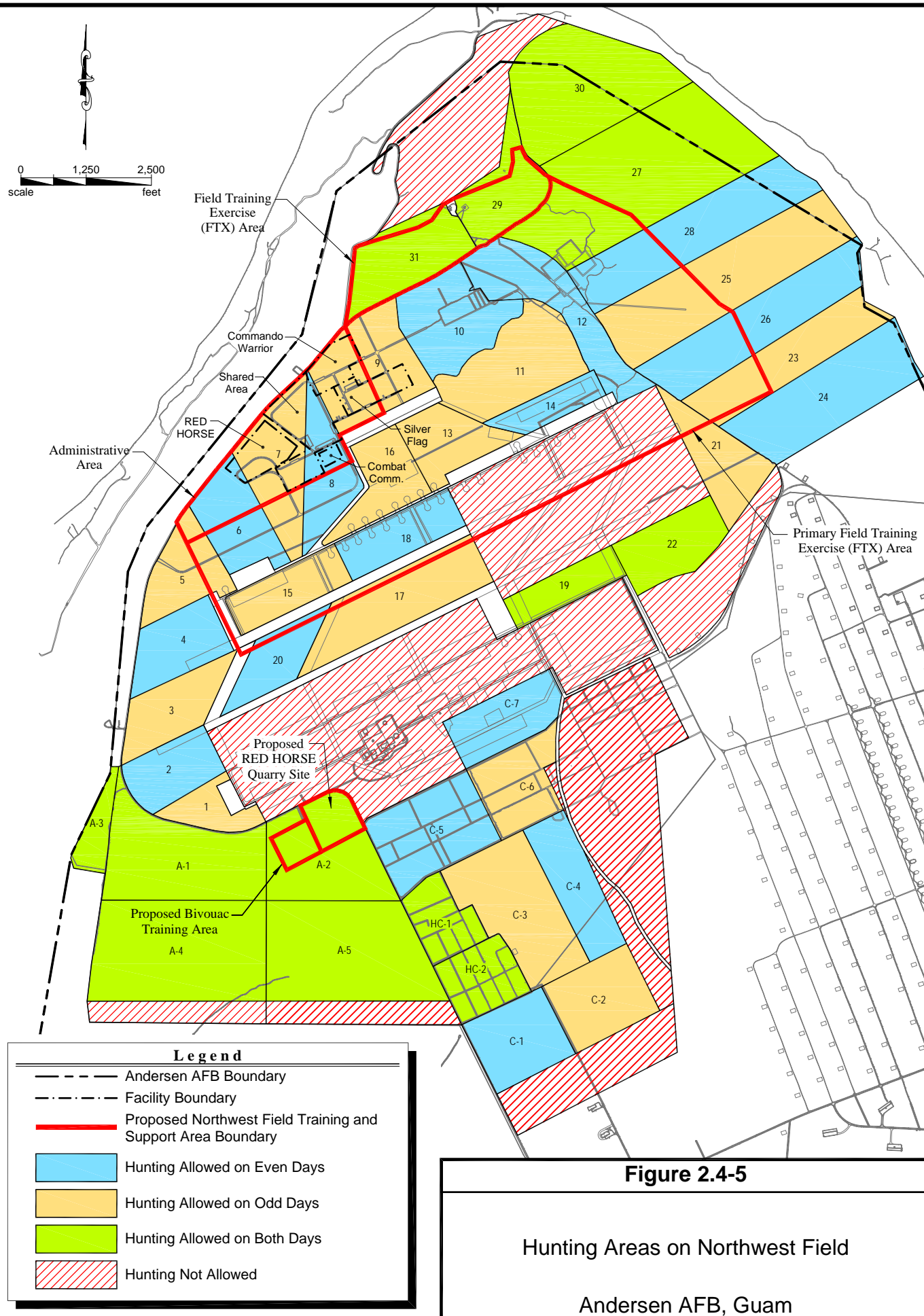
- **Wildlife Management Specialist.** The discussion for the wildlife management specialist for the ISR/Strike project applies to the Northwest Field conservation measure.
- **Ungulate Exclosure Fencing.** About 54 hectares (133 acres) of forest area would be fenced to create exclosures to prevent incursion of deer and pigs. The ungulate exclosure details for the ISR/Strike project apply to the Northwest Field conservation measure. Figure 2.2-7 shows the location of the proposed exclosure area.
- **Ungulate Management and Control Programs.** The discussion for the ungulate management and control programs for the ISR/Strike project applies to the Northwest Field conservation measure. Land available for public hunting currently totals approximately 1,265 hectares (3,126 acres) and is divided into hunting units. Some units are available on alternating days while others are available every day. Recreational hunting in 21 (total 671 hectares or 1,658 acres) hunting units would be eliminated or reduced in size due to the expected training operations in Northwest Field. Depredation hunts would not be conducted in these areas due to safety concerns. Recreational hunting would continue at the same level in the existing hunting units that would not be closed. The public hunting areas on Andersen AFB, and the units that would be removed from hunting in Northwest Field are shown in Figure 2.4-5.

- **Outplanting of Foraging Trees Important to Mariana Crow and Mariana Fruit Bat.** The processes and procedures for the ISR/Strike project apply to the Northwest Field conservation measure. Five 50-meter by 50-meter foraging plots are proposed.
- **Vegetation Surveys Relevant to Recovery of Mariana Crow and Mariana Fruit Bat.** The conservation measures for the ISR/Strike project apply to the Northwest Field conservation measure.
- **Environmental Education and Awareness Information.** This conservation measure is the same as the ISR/Strike measure except that the information concerning conservation issues at Andersen AFB would be made available to participants of the Northwest Field training programs instead of ISR/Strike personnel.
- **Brown Tree Snake Interdiction and Control.** The process and procedures outlined for the ISR/Strike conservation measures apply to the Northwest Field initiatives.
- **Area 50 and Experimental Habitat Management Unit.** Area 50 is an opportunistic experimental HMU south of the Northwest Field runway. This area lies within the overlay refuge, and in 1991 was fenced to exclude ungulates. In 1998, extensive measures were undertaken to remove BTSs from Area 50. The BTS control efforts reduced the population of BTSs enough to allow an experimental attempt to release captive-bred Guam rails into Area 50. Area 50 has also been studied extensively to directly compare forest growth, regeneration, and other ecological characteristics within secondary growth forests found in adjacent areas. The DAWR is the primary entity for these ecological studies. Area 50 would continue to be used for biological resources studies.

A new habitat management unit (HMU) (60 hectares, 148 acres) would be established for biological resources studies within the overlay refuge, south of Northwest Field and west of MSA 1. The goal of the HMU is to create a 148-acre snake enclosure using a typhoon-proof snake barrier. Figure 2.4-6 shows Area 50 and the proposed location for the new HMU. The new HMU would be fenced to prevent incursion of deer, feral pigs, and BTSs. The fence would also be expected to repel feral cats. However, due to the difficulties of constructing a typhoon-proof snake fence, the text states that a weather resistant (*i.e.*, wind, salt spray, *etc.*) fence would be constructed. A fence that could withstand a typhoon in total would be very difficult to construct. Management and operation of the new HMU would be established in a partnering relationship between Andersen AFB, the USFWS, and the DAWR. The Area 50 Restoration Plan, which was developed by DAWR with assistance from the Air Force, United States Geological Service, USDA, and USFWS, will provide guidance for management of the new HMU.

Management guidelines of the new HMU include the following objectives:

- ***Brown tree snake control, including exclusion and eradication.*** Exclusion can be achieved through weather resistant fencing, with an access gate that would also repel snakes. The exclusion barrier would require periodic maintenance (particularly after

**Figure 2.4-5**

Hunting Areas on Northwest Field

Andersen AFB, Guam

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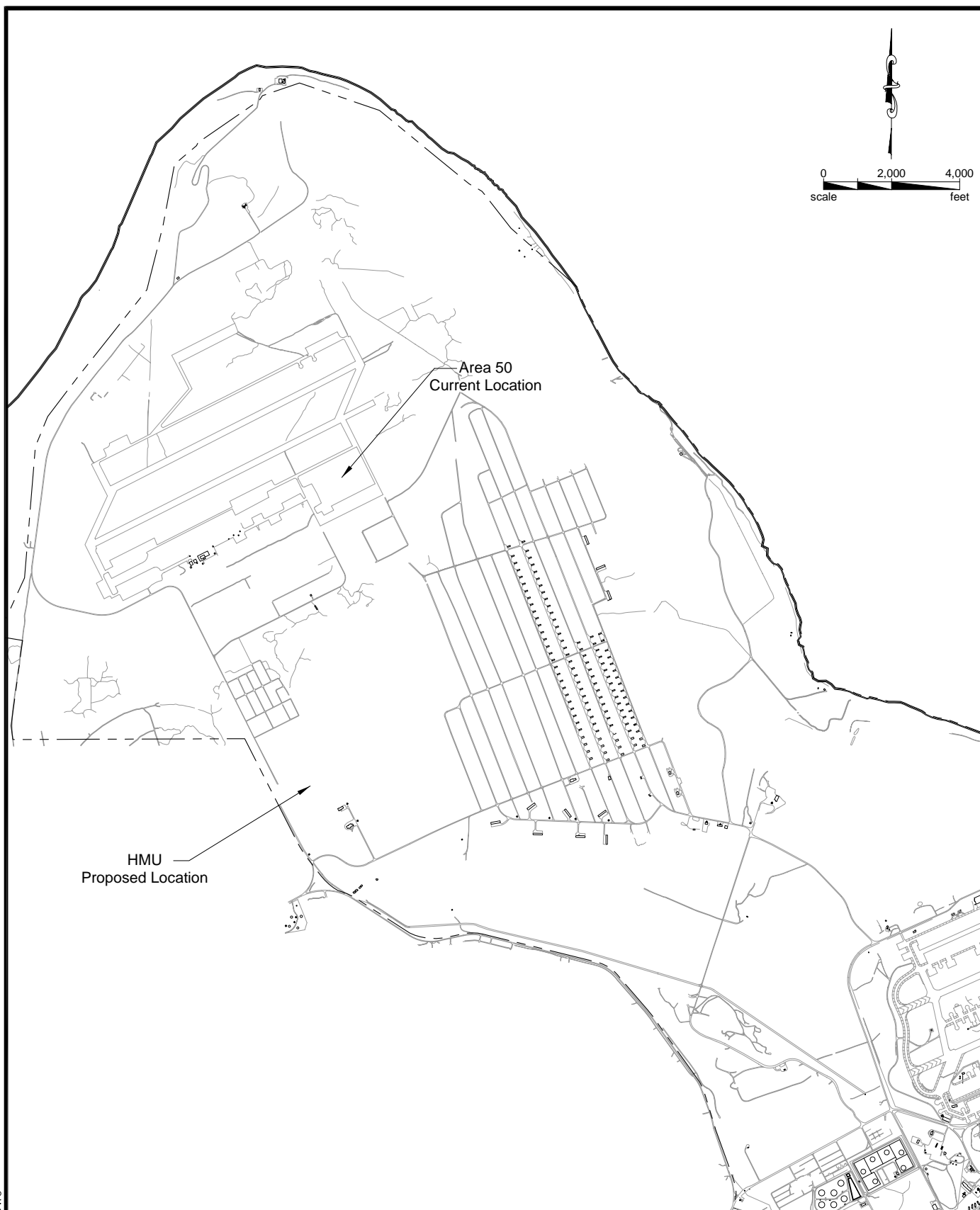


Figure 2.4-6

Location of Area 50 and Proposed New HMU

Andersen AFB, Guam

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typhoons), and vegetation removal around the barrier to prevent barrier breaches by BTSs. Eradication within the barrier can be accomplished through trapping and toxic bait stations, hand captures, visual searches, and monitoring for re-establishing populations (either due to barrier breach or unknown residual snakes).

- **Deer and feral pig control, including exclusion and eradication.** Exclusion would be accomplished with the BTS fence. Eradication would be accomplished through targeted removal within the area by the proposed Wildlife Management Specialist.
- **Feral cat control, including exclusion and eradication.** The BTS fence may be modified slightly to repel cats, and vegetation around the perimeter would be managed to prevent agile cats from climbing adjacent trees or shrubs and breaching the barrier. Eradication within the barrier would be accomplished through cage and leg-hold traps to remove existing cats and monitoring by spotlight surveys for additional animals.
- **Rodent control, including exclusion and population reduction.** Exclusion would be accomplished with the BTS and feral cat fence. Population reduction may be accomplished through targeted rodenticide application using bait boxes and monitoring for population increases using Hagaruma-type and snap traps.
- **Native plant restoration and invasive plant removal.** These activities include outplanting of native woody species and targeted removal of invasive herbaceous species. Outplanting activities would be contingent on ungulate removal.
- **Native bird reintroductions.** Reintroductions may occur in the area if exotic predators are eradicated from the area. It is possible that Guam rails could establish a breeding population in the area.

2.4.3 Other Air Force Unit Relocations to Andersen AFB

A Transportable Airlift Control Element (TALCE) unit and a Logistics Unit would be relocated to Andersen AFB beginning in FY06, with completion occurring during the same time period as the ISR/Strike action. No construction actions would be accomplished to accommodate either of the two units. Training for the TALCE and Logistics Unit would be accomplished within existing facilities. Table 2.4-6 lists the number of personnel associated with each unit.

Table 2.4-6 Additional Personnel Associated with Other Unit Relocations at Andersen AFB

Unit Name	Number of Personnel
Transportable Airlift Control Element	25
Logistics Unit	55
Total	80

Note: The number in the Number of Personnel column reflects military, Air Force civilian, and contractor personnel. It is estimated approximately 25 of the personnel would not be accompanied by dependents and that 55 personnel would be accompanied by an average of 2.5 per each military, Air Force civilian, and contractor employee, or a total of 138 dependents.

2.4.4 Summary of Additional Personnel at Andersen AFB from Other Actions

Table 2.4-7 summarizes the number of permanently based and dependent personnel that would occur under the other Northwest Field initiatives, and unit relocations that would occur at the same time as the establishment of the ISR/Strike capability. The table also details the estimated number of permanently based personnel who would not be accompanied by dependents and those who would be accompanied by dependents. No rotational personnel would occur as a result of the other actions.

Table 2.4-7 Summary of Additional Personnel at Andersen AFB from Other Actions

	Number of People
Permanently Based Military, Air Force Civilian, and Contractor	460
Accompanied	315
Unaccompanied	145
Dependents	788
Total Additional Personnel from Other Actions	1,248

Note: This table reflects the additional personnel associated with the Northwest Field initiatives and the unit relocations. No rotational personnel would occur under any of the other actions and no additional personnel would be associated with the other actions identified for Andersen AFB main.

2.5 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

Alternative A is the Preferred Alternative.

CHAPTER 3 AFFECTED ENVIRONMENT

This chapter describes the existing environmental resources that could be affected by or could affect Alternative A, Alternative B, and the No Action Alternative. Only those specific resources relevant to potential impacts are described in detail. The baseline represents the current condition for the respective resource or conditions that may exist due to the No Action Alternative.

3.1 NOISE

Aviation-related activities at Andersen AFB dominate the acoustic environment. Equipment used during construction also generates noise. Therefore, noise from aircraft operations and construction activities is analyzed. Vehicular activity associated with the operation of government-owned vehicles (GOV) and privately owned vehicles (POV) contributes little to the general background noise levels around the airfield. Thus, noise from vehicle operation is not analyzed.

The characteristics of sound include parameters such as amplitude (loudness), frequency (pitch), and duration. Sound varies over an extremely large range of amplitudes. The decibel is the accepted standard unit for describing levels of sound. Decibels are expressed in logarithmic units to account for the variations in amplitude. On the dB scale, an increase of 3 dB represents a doubling of sound energy. A difference on the order of 10 dB represents a subjective doubling of loudness.

Different sounds have different frequency contents. Because the human ear is not equally sensitive to sound at all frequencies, a frequency-dependent adjustment, called A-weighting, was developed to measure sound similar to the way the human hearing system responds. The adjustments in amplitude, established by the American National Standards Institute (ANSI 1983), are applied to the frequency content of the sound. Figure 3.1-1 depicts typical A-weighted sound pressure levels (dBA) for various sources. As indicated in the figure, 65 dBA is equivalent to normal speech at a distance of 3 feet.

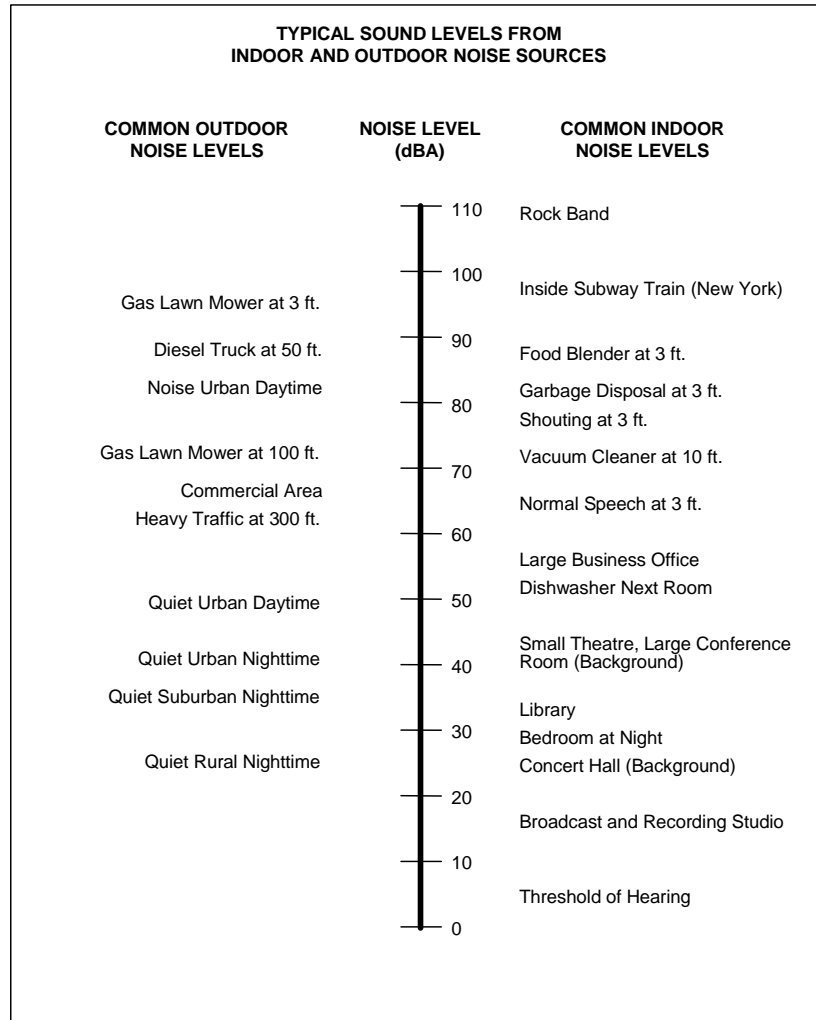
Noise is defined as sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoying. Noise levels change with time and the distance of the receptor from the noise source.

3.1.1 Noise Metrics and Analysis Methods

A variety of metrics may be used to assess the impacts of noise. Depending on the specific situation, appropriate analysis may include single event or averaged metrics. Single event metrics are used to assess the potential impacts of noise on structures and animals, and are sometimes used in the assessment of human effects. Sound exposure level (SEL), a single event metric, is commonly used to evaluate sleep disturbance. Averaged noise metrics are useful in characterizing the overall noise environment and are primarily used to analyze community (population) exposure to noise. Averaged noise exposure is expressed as the day-night average sound level (DNL) metric. The USEPA selected DNL as the uniform descriptor of averaged noise exposure. Subsequently, federal agencies, including the DoD, adopted DNL for expressing

averaged sound. DNL is used to estimate the number of persons potentially highly annoyed by aircraft noise.

Figure 3.1-1 Typical A-Weighted Noise Levels



Single Event Sound Metrics

Although the highest dBA level measured during an event (*i.e.*, maximum sound level, L_{max}) is the most easily understood descriptor for a noise event, alone it provides little information. Specifically, it provides no information concerning either the duration of the event or the amount of sound energy. Thus, SEL, which is a measure of the physical energy of the noise event and accounts for both intensity and duration, is used for single event noise analysis. Subjective tests indicate that human response to noise is a function not only of the maximum level, but also of the duration of the event and its variation with respect to time. Evidence indicates that two noise events with equal sound energy will produce the same response. For example, a noise at a constant level of 85 dBA lasting for 10 seconds would be judged to be equally as annoying as a noise event at a constant level of 82 dBA and duration of 20 seconds (*i.e.*, 3 dBA decrease equals one half the sound energy but lasting for twice the time period). This is known as the “equal

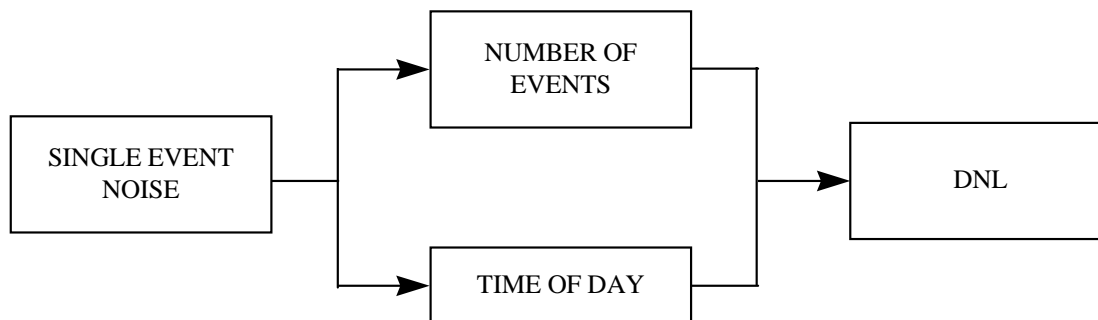
energy principle.” The SEL value represents the A-weighted level of a constant sound with a duration of 1 second, providing an amount of sound energy equal to the event under consideration.

By definition, SEL values are referenced to a duration of 1 second and should not be confused with either the average (L_{eq}) or L_{max} associated with a specific event. The L_{eq} is the constant level which has the same A-weighted sound energy as that contained in the time-varying sound. When an event lasts longer than 1 second, the SEL value will be higher than the L_{max} from the event. The L_{max} would typically be 5 to 10 dBA below the SEL value for aircraft overflight.

Averaged Noise Metrics

Single event analysis has a major shortcoming -- single event metrics do not describe the overall noise environment. DNL is the measure of the total noise environment. DNL averages the sum of all aircraft noise producing events over a 24-hour period, with a 10 dBA upward adjustment added to the nighttime events (between 10:00 p.m. and 7:00 a.m.). Figure 3.1-2 depicts the relationship of the single event, the number of events, the time of day, and DNL. This adjustment is an effort to account for increased human sensitivity to nighttime noise events. The summing of sound during a 24-hour period does not ignore the louder single events, it actually tends to emphasize both the sound level and number of those events. The logarithmic nature of the dB unit causes sound levels of the loudest events to control the 24-hour average.

Figure 3.1-2 Day-Night Average A-Weighted Sound Level



DNL is the accepted unit for quantifying annoyance to humans from general environmental noise, including aircraft noise. The Federal Interagency Committee on Urban Noise (FICUN) developed land use compatibility guidelines for noise exposure areas (FICUN 1980). Based on these FICUN guidelines, the Federal Aviation Administration (FAA) developed recommended land uses in aircraft noise exposure areas. The Air Force uses DNL as the method to estimate the amount of exposure to aircraft noise and predict impacts. Land use compatibility and incompatibility are determined by comparing the predicted DNL level at a site with the recommended land uses.

Noise Analysis Methods

NOISEMAP noise model, version 7.296, was used to develop the noise contours and DNL and SEL values from airfield operations for this EIS. Maximum sound level noise used in this EIS was calculated by using the Flyover Noise Calculator (USAF 2002).

NOISEMAP is a suite of computer programs developed by the Air Force to predict noise exposure in the vicinity of an airfield due to aircraft flight, maintenance, and ground run-up operations. Data describing flight tracks and flight profile use, power settings, ground run-up information by type of aircraft/engine, and meteorological variables are assembled and processed for input into NOISEMAP. The model uses this information to calculate SEL and DNL values at points on a regularly spaced grid surrounding the airfield. A plotting program generates contour lines connecting points of equal DNL values in a manner similar to elevation contours shown on topographic maps. Contours are generated as 5 dB intervals beginning at DNL 65 dBA, the maximum level considered acceptable for unrestricted residential use. The contours produced by NOISEMAP are used in the averaged noise analysis sections in this EIS. While there is no technical reason why a lower level cannot be measured or calculated for comparison purposes, DNL 65 dBA:

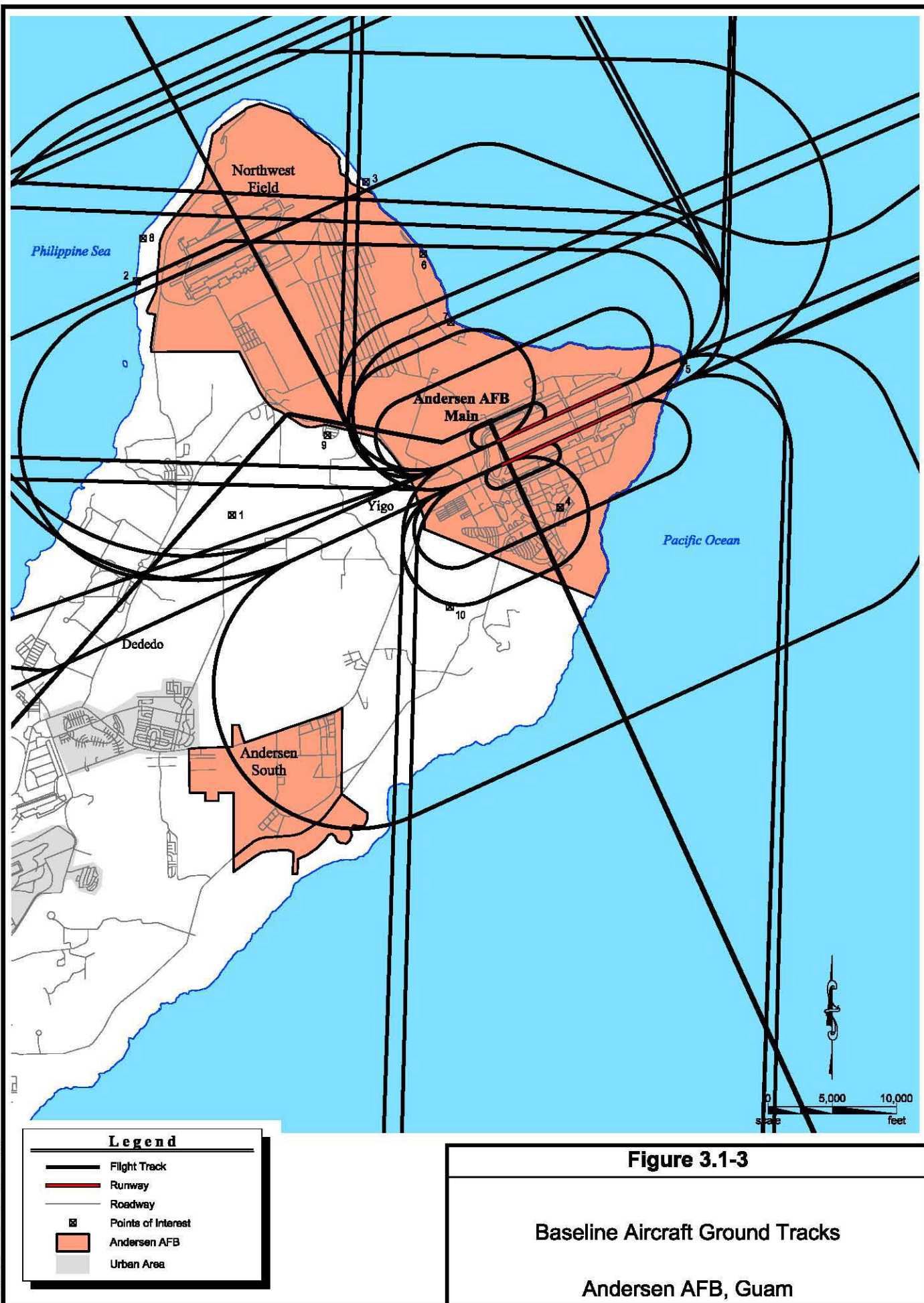
- has been adopted by the DoD, USEPA, FAA, and HUD as the threshold for comparing and assessing community noise effects; and
- represents a noise exposure level which is normally dominated by aircraft noise and not other community or nearby highway noise sources.

Although the number of military and civil aircraft operations at an installation usually varies from day to day, NOISEMAP requires input of the specific numbers of daily flight and aircraft maintenance engine runup operations. The Air Force does not follow the Federal Aviation Administration's use of the "average annual day" in which annual operations are averaged over an entire 365-day year. Neither does the Air Force use the "worst-case day" since it typically does not represent the typical noise exposure. Instead, the Air Force uses the "average busy day" concept in which annual operations for an aircraft type are averaged over the number of flying days per year by that aircraft type. Non-flying days (*e.g.*, weekends or holidays) are not used in computing the "average busy day" operations. The "average busy day" concept is used for noise modeling in this EIS.

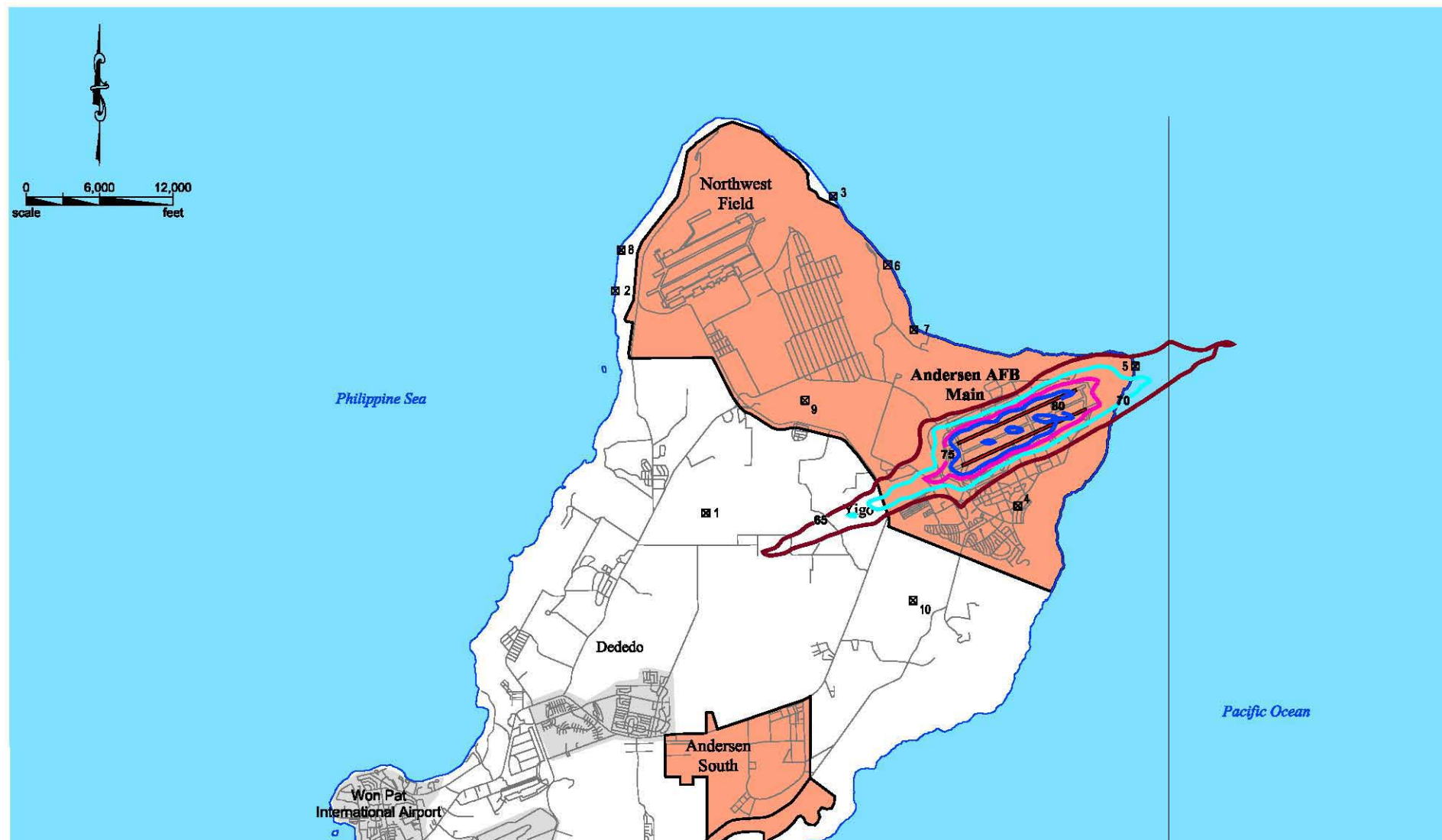
3.1.2 Baseline Noise Analysis

The primary source of noise in the vicinity of Andersen AFB is airfield operations. Baseline noise conditions are based on the average daily airfield operations shown on Table 2.3-1 (No Action Alternative). About 235 average daily airfield operations occur at Andersen AFB under the baseline condition. Approximately 5 percent of the operations occur during the nighttime (10:00 p.m. to 7:00 a.m.). These operations and the resultant baseline noise environment are based on airfield operations data collected in 2003 (AFCEE 2003). Figure 3.1-3 shows the baseline condition aircraft ground tracks, and Figure 3.1-4 depicts the noise exposure area for the baseline.

Residences and public use facilities such as schools, libraries, hospitals, churches, nursing homes, and recreational areas are more sensitive to noise than those in other types of facilities because the activities that take place in those structures require lower sound levels and, for that reason, were selected for use as analysis points for the effect of aircraft noise at these public facilities. Table 3.1-1 lists the DNL and SEL values at the 10 points selected for analysis for the aircraft producing the greatest SEL at the point. The maximum sound level at the analysis point would typically be 5 to 10 dBA below the SEL value for aircraft overflight.



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Legend

- | | |
|----------------------|----------------------|
| — DNL 65 dBA Contour | — Runway |
| — DNL 70 dBA Contour | — Roadway |
| — DNL 75 dBA Contour | ☒ Points of Interest |
| — DNL 80 dBA Contour | ■ Andersen AFB |
| | ■ Urban Area |

Figure 3.1-4

Baseline Noise Contours

Andersen AFB, Guam

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Single Event Sound Analysis

Single event analysis is conducted to evaluate effects on noise-sensitive receptors. Figures 3.1-3 and 3.1-4 show the ten points identified for analysis in the area surrounding the airfield. These points are locations where the public may be sensitive to noise from single aircraft overflight events.

Table 3.1-1 Baseline DNL and SEL at Analysis Points

Number	Description	DNL (dBA)	Aircraft	SEL (dBA)
1	Dededo	49	C-5	99
2	Falcona Beach	47	C-5	108
3	Jinapsan Beach	47	C-5	111
4	Andersen AFB Middle School	55	EA-6B	103
5	Pati Point	66	C-5	116
6	Tarague Beach	44	C-5	98
7	Tarague Channel	44	F-18	97
8	Uruno Point	36	C-5	90
9	Off-Base School	41	C-5	106
10	Yigo	54	EA-6B	108

Note: The SEL shown in the table is the loudest SEL for only those aircraft flying the top 20 flight tracks events contributing the most DNL at each location. NOISEMAP determines the SEL for the 20 flight track events contributing the most DNL at each analysis point. These SEL values may not necessarily be the loudest SEL values occurring at each point. It is possible for an aircraft to produce a larger SEL, but because of the infrequency of occurrence, the aircraft would not be among the top 20 contributors to the DNL level at the location. The maximum sound level would typically be 5 to 10 dBA below the SEL value for aircraft overflight. The analysis point number and description correspond to the point as reflected on the noise contour and aircraft ground track figures. There may be minor differences when comparing the DNL for a point from the table to the DNL for the point as depicted on the noise contour figure. This difference is a result of small misalignments during the process of overlaying the noise contours the background map.

Day-Night Average Noise Analysis

Table 3.1-2 presents the results of over a dozen studies on the relationship between noise and annoyance levels. This relationship was suggested by Schultz (1978) and was reevaluated for use in describing the reaction of people to environmental noise (Fidell, *et al.* 1988). These data provide a perspective on the level of annoyance that might occur. For example, 12 to 22 percent of people exposed on a long-term basis to DNL of 65 to 70 dBA are expected to be potentially highly annoyed by noise events. The study results summarized in Table 3.1-2 are based on outdoor noise levels.

Table 3.1-2 Theoretical Percentage of Population Potentially Highly Annoyed by Noise Exposure

DNL Intervals in dBA	Percentage of Persons Highly Annoyed
<65	<12
65-70	12-22
70-75	22-37
75-80	37-54
>80	61

Note: Noise impacts on individuals vary as do individual reaction to noise. This is a general prediction of the percent of the community potentially highly annoyed based on environmental noise surveys conducted around the world.

Source: Adapted from NAS 1977

Figure 3.1-4 shows the DNL noise contours for the baseline average daily airfield operations condition at Andersen AFB. Table 3.1-3 lists the number of acres (land area off-Base, excluding water surface), the number of people within the DNL 65 dBA and greater noise exposure area, and the estimated number of people who might be potentially highly annoyed by noise at those levels.

Table 3.1-3 Baseline Noise Exposure

Category	DNL Interval (dBA)				Total
	65-70	70-75	75-80	80+	
Acres	353	22	0	0	375
People	242	14	0	0	256
People Potentially Highly Annoyed	53	5	0	0	58

Note: Acres reflect only off-Base land area (excluding water surface). Population data used to determine the number of people within a noise zone were obtained from the United States Census Bureau 2000 census. It was assumed that population was equally distributed within a census tract area to estimate affected population. Using the noise contour information, the number of acres of land in each noise zone (e.g., DNL 65-70 dBA, 70-75 dBA, 75-80 dBA, and 80 dBA and greater) were divided by the number of acres of land in each census block to determine the portion of the census tract within each noise zone. The population total in each block-group was then multiplied by this ratio to estimate affected population within each zone. This process was used throughout the EIS. People highly annoyed were determined by multiplying the total number of people in the noise zone times the higher percent number for the interval in Table 3.1-2

Effect of Aircraft Noise on Wildlife

In addition to effects of aircraft noise on humans, there is a possibility that animals near the airfield would be affected by noise from baseline aircraft operations, particularly mammals (bats) and birds. Subchapter 4.5 contains additional information concerning the effects of aircraft noise on the Mariana crow and Mariana fruit bat.

3.2 LAND USE

Andersen AFB is located on the north half of the Island of Guam. The Base is bounded on the south by Yigo and Dededo, by the Pacific Ocean to the north and east, and by the Philippine

Sea to the west. The majority of residents in Guam reside on the northern half of the island. Most of the off-Base land use in the vicinity of Andersen AFB is considered low density residential.

A narrow strip of non-Air Force land lies between Andersen AFB and the Pacific Ocean and the Philippine Sea to the north, northeast, and northwest of the Base boundary. The land to the northeast is accessed by the owners through a corridor on the Base under an agreement between the land owners and the Air Force.

Figure 3.2-1 depicts the land uses for Andersen main base established in the Andersen AFB General Plan. The land use categories include: administrative, aircraft operations and maintenance, airfield, community, housing (unaccompanied), housing (accompanied), industrial, medical, open space, outdoor recreation, and water.

The purpose of the long-standing AICUZ program is to promote compatible land development in areas subject to aircraft noise and accident potential around military airfields. The Air Force has no desire to recommend land use regulations that render property economically useless. An AICUZ Study reaffirms Air Force policy of assisting local, regional, state, and federal officials in the areas surrounding the military installation by promoting compatible development within the AICUZ area of influence; and protecting Air Force operational capability from the effects of land use that are incompatible with aircraft operations. AICUZ studies make recommendations for local government agencies to plan, zone, and mitigate noise, and to help protect the integrity of the installation's flying mission.

AICUZ land use guidelines (see Table 3.2-1) reflect land use recommendations for clear zones (CZ), accident potential zones (APZ) I and II, and four noise exposure zones. Figure 3.2-2 depicts the CZs and APZs for Andersen AFB. The figure also depicts the four noise exposure zones based on the aircraft noise modeling accomplished for the Andersen AFB AICUZ Report prepared in 1998 and released to the public in 2001 (Andersen AFB 1998). The AICUZ Report is referred to as the 2001 AICUZ Report in this EIS. The noise contours in Figure 3.2-2 are not used for the baseline noise condition (No Action Alternative) in this EIS because the noise contours prepared from the aircraft operations data collected by AFCEE in 2003 more accurately reflect the current operations condition. The following paragraphs define the CZ and APZs.

- Clear Zone Surface—The CZ width is 3,000 feet (1,500 feet to either side of runway centerline) and extends outward 3,000 feet. Some obstructions may occur within the CZ if permitted under AICUZ land use guidelines, or if appropriate authorities waive airfield planning guidance. Of the three zones (*i.e.*, CZ, APZ I and APZ II, the CZ is the area with the greatest potential for an accident (see Figure 3.11-1).
- Accident Potential Zone Surfaces - APZ I begins at the outer end of the CZ and is 5,000 feet long and 3,000 feet wide. APZ II begins at the outer end of APZ I and is 7,000 feet long and 3,000 feet wide. APZ I has less accident potential than the CZ and APZ II has less potential than APZ I.

The land use guidelines in Table 3.2-1 were established on the basis of studies prepared and sponsored by several federal agencies, including the Department of Housing and Urban Development, USEPA, Air Force, and state and local agencies. The guidelines recommend land uses that are compatible with airfield operations while allowing maximum beneficial use of adjacent properties. The Air Force has an obligation to the inhabitants of the areas surrounding

Andersen AFB and to the citizens of the United States to point out ways to protect the people in adjacent areas, as well as the public investment in the installation itself.

Table 3.2-1 Recommended Land Use

Generalized Land Use	Clear Zones and Accident Potential Zones			Noise Zones			
	CZ	APZ I	APZ II	65-69 dBA	70-74 dBA	75-79 dBA	80+ dBA
Residential	No	No	Yes ¹	Not Recommended ⁴	Not Recommended ⁴	Not Recommended	Not Recommended
Commercial	No	No	Yes ²	Recommended	Recommended	Recommended	Not Recommended
Industrial	No	Yes ²	Yes ²	Recommended	Recommended	Recommended	Recommended
Public/Quasi-Public	No	No	Yes ²	Recommended	Not Recommended ⁴	Not Recommended ⁴	Not Recommended
Recreational	No	Yes ²	Yes ²	Recommended	Recommended	Not Recommended	Not Recommended
Open/Agriculture/Low Density	No ³	Yes ²	Yes ²	Recommended	Recommended	Recommended	Recommended

1. Suggested maximum density one dwelling unit per acre.

2. Only limited low-density, low-intensity uses recommended.

3. Except for limited agricultural uses.

4. Unless sound attenuation materials are installed.

Source: Adapted from USAF 1999.

Most of the off-Base land in the immediate vicinity of Andersen AFB main base is undeveloped or residential with low to moderate density. The 2001 AICUZ Report indicates there is no off-Base incompatible land use resulting from aircraft noise (Andersen AFB 1998).

About 718 acres of land in the Village of Yigo occur in APZ II to the southwest of the Base. As shown on Figure 3.2-2, APZ II for Runways 06 Left and Right occurs outside the Andersen AFB boundary. The area surrounding this APZ continues the trend of low-to-moderate density housing with pockets of commercial activity along major roads. The 2001 AICUZ Report indicates there are 140 acres of residential land in the Runways 06 Left and Right APZ II that are considered incompatible when considering the safety element of the AICUZ program. Housing units range from two to four units per acre and exceed the one to two dwelling units per acre maximum recommended for APZ II (Andersen AFB 1998).

All other CZs and APZs occur either within the Andersen AFB boundary or are over water to the northeast. Therefore, there is no incompatible land uses in these areas when considering the safety element of the AICUZ program.

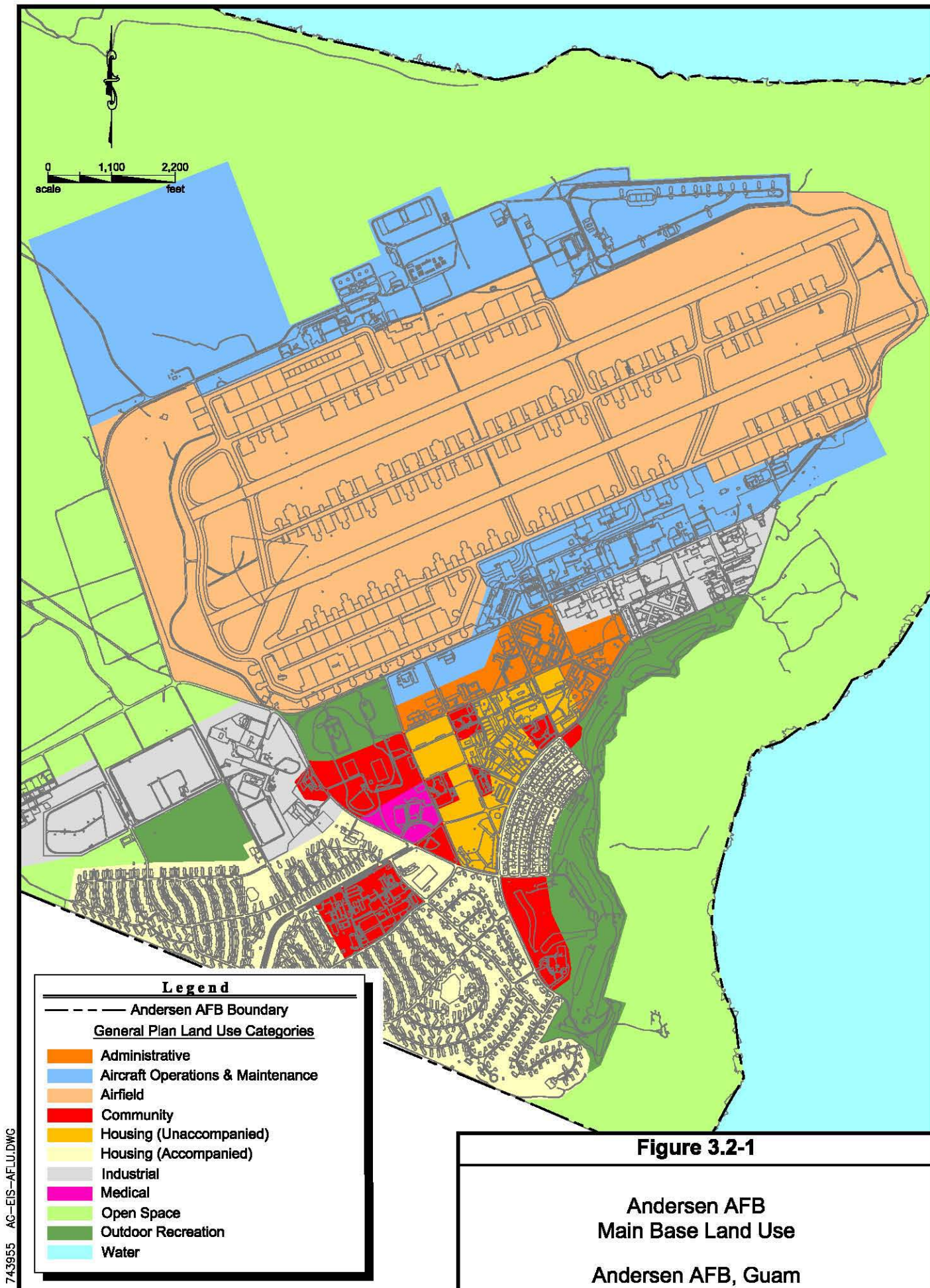
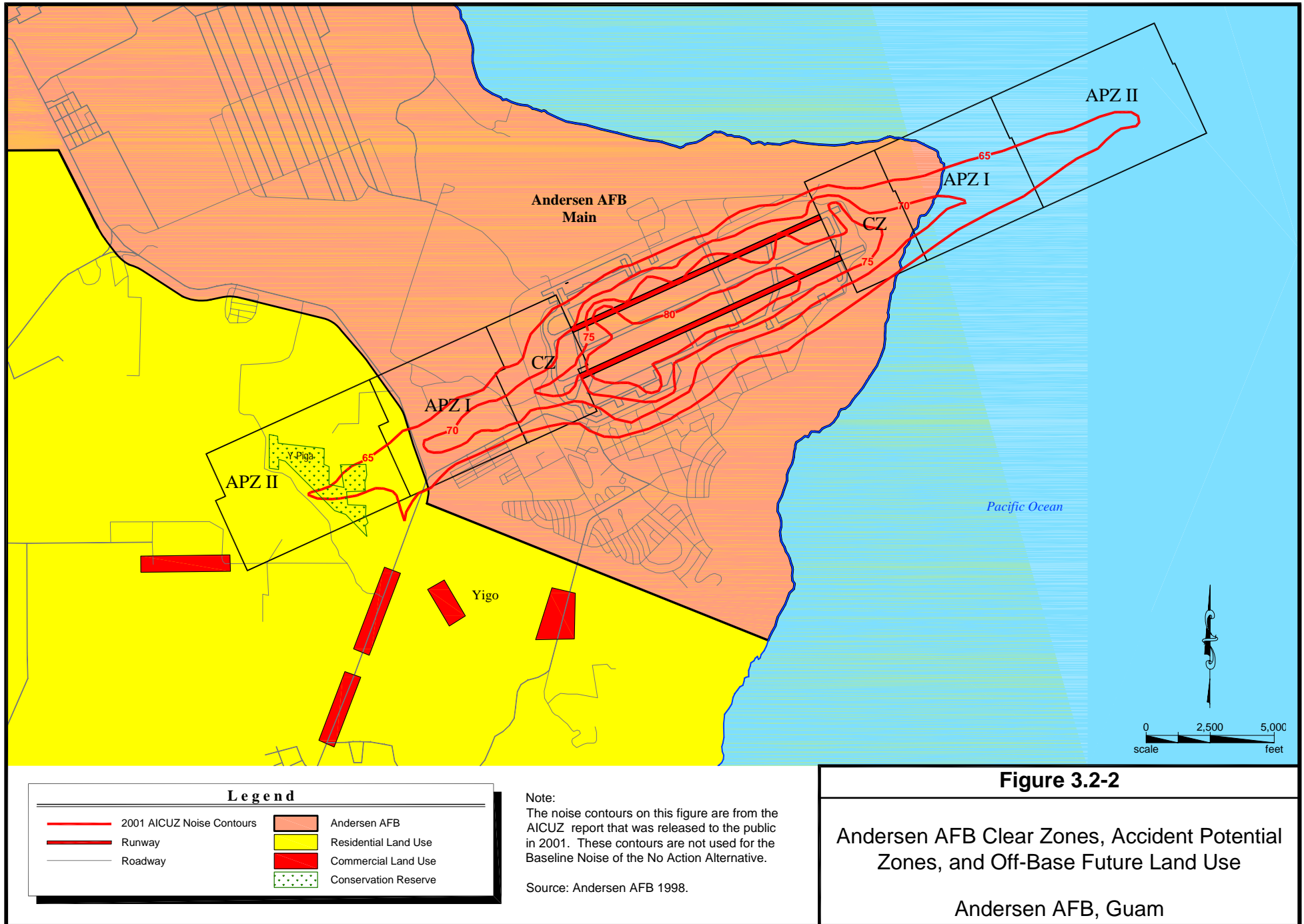


Figure 3.2-1

Andersen AFB
Main Base Land Use

Andersen AFB, Guam

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Future land use in Guam is based on the Land Use Intensity system of land use planning. This system concentrates on the intensity of use instead of the type of use and assumes that certain uses have about the same impact on the land, such as residential and office use. The Runway 06 Left and Right APZ II is a naturally pervious area consisting of a number of sinkholes that allow rapid recharging of the aquifer, and development in the area is limited because of the importance of the recharge capability (Andersen AFB 1998). Figure 3.2-2 depicts the future land use for the off-Base area to the immediate south and west of the main base. Andersen AFB works closely with Guam planning offices to ensure compatible development in areas adjacent to the Base.

3.3 AIR QUALITY

Air quality in any given region is measured by the concentration of various pollutants in the atmosphere, typically expressed in units of parts per million (ppm) or in units of micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). Air quality is not only determined by the types and quantities of atmospheric pollutants, but also by surface topography, size of the air basin, and by prevailing meteorological conditions. The six criteria pollutants are ozone (O_3), particulate matter (PM_{10}), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and lead (Pb).

Ozone (ground-level ozone), which is a major component of “smog,” is a secondary pollutant formed in the atmosphere by photochemical reactions involving previously emitted pollutants or precursors. Ozone precursors are mainly nitrogen oxides (NO_x) and volatile organic compounds (VOC). NO_x is the designation given to the group of all oxygenated nitrogen species, including nitric oxide (NO), NO_2 , nitrous oxide (N_2O), and others. However, only NO, NO_2 , and N_2O are found in appreciable quantities in the atmosphere. VOCs are organic compounds (containing at least carbon and hydrogen) that participate in photochemical reactions and include carbonaceous compounds except metallic carbonates, metallic carbides, ammonium carbonate, carbon dioxide, and carbonic acid. Some VOCs are considered non-reactive under atmospheric conditions and include methane, ethane, and several other organic compounds. The level of O_3 in the air depends on the outdoor levels of these organic gases, the radiant energy of the sun, and other weather conditions. The biggest concern with high O_3 concentrations is the damage it causes to human health, vegetation, and many common materials used everyday. High O_3 concentrations can cause shortness of breath, coughing, wheezing, headaches, nausea, eye and throat irritations, and lung damage.

There are two categories of particulate matter: particles with diameters less than 10 microns (PM_{10}); and particles with diameters less than 2.5 microns ($\text{PM}_{2.5}$). Currently, there are area designations only for PM_{10} . The sources of PM_{10} emissions include industrial and agricultural operations, automobile exhaust, and construction. Since PM_{10} is so small, it is not easily filtered and can penetrate into deeper portions of the lungs. Chronic and acute respiratory illnesses may be caused from inhalation of PM_{10} .

Particulate matter, which comes from diesel exhaust, is a concern. Diesel exhaust is emitted from a broad range of diesel engines, including the on-road diesel engines of trucks and the off-road diesel engines of heavy duty equipment. Exposure to diesel particulate matter is most commonly through breathing the air that contains the diesel particulate matter. Exposure to diesel particulate matter comes from both on-road and off-road engine exhaust that is either

directly emitted from the engines or aged through lingering in the atmosphere. Diesel exhaust causes health effects from both short term or acute exposures and also long term chronic exposures. Acute exposure to diesel exhaust may cause irritation to the eyes, nose, throat, and lungs, and some neurological effects such as lightheadedness. Acute exposure may also elicit coughing or nausea and exacerbate asthma. Chronic exposures in experimental animal inhalation studies show a range of dose-dependent lung inflammation and cellular changes in the lung. There are also diesel exhaust immunological effects. Based on human and laboratory studies, there is considerable evidence that diesel exhaust is a likely carcinogen. Human epidemiological studies demonstrate an association between diesel exhaust exposure and increased lung cancer rates in occupational settings (USEPA 2006a).

Nitrogen dioxide is a reddish-brown to dark brown poisonous gas that produces an irritating odor. It is a byproduct of high combustion sources. Health effects include damage to lungs, bronchial and respiratory system irritation, headaches, nausea, coughing, choking, and chest pains.

Carbon monoxide is a colorless, odorless, and tasteless toxic gas found naturally in trace quantities in the atmosphere and emitted from any form of combustion. At low concentrations, the central nervous system is affected. At higher concentrations, irritability, headaches, rapid breathing, blurred vision, lack of coordination, nausea, and dizziness can all occur. It is especially dangerous indoors when ventilation is inadequate; unconsciousness or death can occur.

Sulfur dioxide (SO₂) is a colorless gas with a strong suffocating odor. It is a gas resulting from the burning of sulfur-containing fuels. Exposure to SO₂ can irritate the respiratory system, including lung and throat irritations and nasal bleeding. In the presence of moisture, SO₂ can form sulfuric acid that can cause damage to vegetation.

Lead is a bluish-white to silvery gray solid. Lead particles can originate from motor vehicle exhaust, industrial smelters, and battery plants. Health effects include decreased motor function, reflexes, and learning; as well as damage to the central nervous system, kidneys, and brain. At high levels of exposure to lead, seizures, coma, or death may occur.

3.3.1 Regulatory Requirements

The CAA directed the USEPA to develop, implement, and enforce strong environmental regulations that would ensure cleaner air for all Americans. To protect public health and welfare, the USEPA developed concentration-based standards called National Ambient Air Quality Standards (NAAQS). Enactment of the CAA was driven by the failure of nearly 100 U.S. cities to meet the NAAQS for O₃ and CO, and by the inherent limitations in previous regulations to effectively deal with those and other air quality problems. The USEPA established both primary and secondary NAAQSs under provisions of the CAA. Primary standards define levels of air quality necessary to protect public health with an adequate margin of safety. Secondary standards define levels of air quality necessary to protect public welfare (e.g., soil, vegetation, property, and wildlife) from any known adverse impacts.

The CAA does not make the NAAQSs directly enforceable. However, it does require each state to promulgate a state implementation plan to provide for “implementation, maintenance, and enforcement” of the NAAQS in nonattainment areas. The General Conformity Rule,

published in 58 Federal Register 63214 (November 30, 1993) and codified at 40 CFR part 93, subpart B, requires federal agencies to prepare written conformity determinations for federal actions in or affecting nonattainment areas, except when the action is covered under the Transportation Conformity Rule or when the action is exempted because the total increase in emissions is below the threshold emissions limits. The General Conformity Rule applies to federal actions occurring in air basins designated as nonattainment for criteria pollutants or areas designated as maintenance areas. Federal actions occurring in air basins in attainment of the NAAQSs are not subject to the General Conformity Rule.

3.3.2 Regional Air Quality

Andersen AFB is located in Agana County within the Guam Air Quality Control Region (AQCR) 246 which includes the entire Island of Guam. The Guam EPA is responsible for air quality within AQCR 246. The USEPA designated the entire Island of Guam to be in attainment or unclassified for all criteria pollutants, except for SO₂ within a 2-mile radius of the Tanguisson, Piti, and Cabras power plants. The power plant nearest Andersen AFB is the Tanguisson Plant, approximately 10 miles southwest of the Base.

3.3.3 Andersen AFB Air Emissions

Andersen AFB is a major source for purposes of the CAA Title V operating permit program. However, Andersen AFB currently operates under a more lenient permit under Guam's conditional exemption from Title V in 40 CFR 69.13. As a result, Andersen AFB's Potential To Emit must be examined to determine which regulatory threshold is most stringent for the Base. Andersen AFB is classified as a major Prevention of Significant Deterioration (PSD) source under Section 1105 of Guam's Air Pollution Control Standards and Regulations. Therefore, the PSD thresholds are the most stringent regulatory thresholds that apply to Andersen AFB.

An emissions inventory was not available for AQCR 246. Current emission quantities for Andersen AFB, presented in Table 3.3-1 include emissions from stationary sources, fuel tanks, fuel facilities, and aircraft, AGE, GOV, and POV operations. The 2003 emissions inventory is the most current and is used to describe the existing condition. The 2003 emissions inventory reflects the actual emissions for that calendar year. Mobile and stationary operational emissions can, and do, vary substantially from year to year while remaining within allowable limits.

Table 3.3-1 Baseline Emissions Inventory

Criteria Air Pollutant	CO (tpy)	VOC (tpy)	NO _x (tpy)	SO _x (tpy)	PM ₁₀ (tpy)	HAPs (tpy)
Aircraft Operation ^a	75.0	21.1	39.0	11.6	14.8	0.01
AGE Operation ^a	4.5	1.7	33.6	249.2	2.0	0.03
Fuel Tanks ^a	0.0	2.5	0.0	0.0	0.0	0.23
Fuel Facilities ^a	0.0	23.0	0.0	0.0	0.0	0.07
POV Operation ^a	111.2	8.0	12.8	1.2	80.1	0.86
GOV Operation ^a	28.4	3.4	9.1	0.7	8.6	0.26
Stationary Sources ^a	27.0	11.1	122.1	14.4	6.9	2.37
Total Andersen AFB Emissions	246.2	70.8	216.6	277.1	112.3	3.83

Note: VOC is not a criterion pollutant. However, VOC is reported because, as an ozone precursor, it is a controlled pollutant.

CO= carbon monoxide

NO_x= nitrogen oxides

SO_x= sulfur oxides

tpy= tons per year

HAPs= hazardous air pollutants

^a USAF 2005c

PM₁₀= particulate matter less than 10 microns in diameter

3.3.4 Radon

Andersen AFB is in an area in which the radioactive gas radon is known to occur (USEPA 2004). The only known health risk associated with exposure to elevated levels of radon is an increased risk of developing lung cancer. Electrically charged radon atoms can attach to dust particles in indoor air. These dust particles can be inhaled into the lungs and adhere to the lining. The deposited atoms decay by emitting radiation that has the potential to damage the cells in the lungs. Typically, outside air contains very low levels of radon (USEPA 1998a). However, radon can accumulate in enclosed indoor spaces. The level at which the USEPA recommends consideration of radon mitigation measures is 4 picoCuries per liter (pCi/L). This level is based on the assumption that an individual will be exposed to those levels at least 75 percent of the time, a situation usually found only in residences (USEPA 1992).

In the past, naturally occurring radon levels in the indoor air of on-Base housing units were above the USEPA's recommended action level of 4 pCi/L. The full extent of this past exposure pathway is unknown and, therefore, the hazards associated with potential exposures are uncertain. The Air Force renovated 755 houses on Andersen AFB for radon abatement (as of May 2000). Only a few recently tested housing units contained elevated levels (between 4 and 20 pCi/L) of radon. The Air Force continues its radon monitoring and abatement program, and is taking action to ensure that Base housing meets health guidelines established for radon (Andersen AFB 2005a).

3.4 INFRASTRUCTURE AND UTILITIES

3.4.1 Water Supply

Potable water at Andersen AFB is supplied by transmission mains from eight wells on Andersen South that draw water from the Northern Guam Lens aquifer (USAF 2003a). The aquifer has been designated by USEPA as a Sole Source Aquifer under the Safe Drinking Water Act. The Guam EPA issues well-operating permits that limit the production from each well (USAF 2003a). There are three non-potable wells that provide irrigation water in addition to the potable water wells (Andersen AFB 2000).

The combined measured capacity of the eight active potable water wells is 3.6 million gallons per day (mgd). The current on-line capacity of the system is 3.1 mgd. The volume of water available to the Base includes the maximum production capacity of the drinking water treatment plant and the Base's treated water storage capacity, for a total of 6.3 mgd. There is a 12-inch water line that connects the Navy water system and the Air Force transmission line. An agreement with the Navy allows the Air Force to receive water from the Navy's water system during an emergency (Andersen AFB 2000; Andersen AFB 2005c). The Base also has one reverse osmosis treatment unit that can produce drinking water from seawater to sustain about 5,500 personnel. All drinking water is treated with chlorine and fluoride and is managed by Civil Engineering and Bioenvironmental Engineering. Civil Engineering manages the maintenance and operations of the drinking water supply and distribution, while Bioenvironmental Engineering monitors the quality of the drinking water and addresses any related health concerns. Water quality sampling is conducted in accordance with approved USEPA methods and certified laboratories. A number of contaminants were detected in samples

collected by Andersen AFB Bioenvironmental Engineering, but none exceeded any USEPA standards. Detected contaminants included lead, copper, benzene, carbon tetrachloride, chlorobenzene, p-dichlorobenzene, o-dichlorobenzene, 1,2-dichloroethane, 1,1-dichloroethylene, *cis*-1,2-dichloroethylene, *trans*-1,2-dichloroethylene, methylene chloride, 1,2-dichloropropane, ethylbenzene, styrene, tetrachloroethylene, toluene, 1,24-trichlorobenzene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethylene, vinyl chloride, and exylenes (CCR 2004).

Based on infrastructure system capability and overall water demand, the Base is able to support 83 percent of its current demand, meaning there is insufficient capacity to meet potable water and fire fighting demand, which is 1.2 mgd. The Base is currently addressing the water supply system shortfalls by installing a new well field and upgrading the distribution system (Andersen AFB 2005c). The project at Andersen AFB was started in 2003 and completion is projected for March 2007 (Torres 2006). The project would construct 10 new on-Base wells extending north of Arc Light Boulevard to Northwest Field. The total water system capacity (*i.e.*, existing capacity [3.1 mgd] plus that from the new wells [1.4 mgd]) should be 4.5 mgd (Cruz 2005a).

The Andersen AFB on-Base population is approximately 5,900 (Andersen AFB 2004a). Assuming a baseline water consumption rate of 100 gallons per day (gpd) (USEPA 2005), a total of 590,700 gpd (0.59 mgd) is used for all on-Base personnel. The 0.59 mgd water use by personnel would equate to 13 percent of the expanded system capacity.

A hydraulic study of the Andersen AFB water distribution system was accomplished in July 2003 because of tuberculation (deposits of corrosive product) in the old cast iron pipes. Results of the study concluded that major water transmission lines needed to be replaced to provide adequate flow and pressure to facilities in the future. A leak detection study conducted in March 2004 concluded there were substantial leaks in the system (USAF 2004a). Approximately 910.6 million gallons of water were pumped from the supply wells between March 2004 and March 2005 (USAF 2005a), which equated to a flow rate of approximately 2.5 mgd. Therefore, water system losses were substantially higher than water usage on Base; that is, 2.5 mgd pumped minus the estimated 0.59 mgd for personnel usage approximated a water loss of 1.91 mgd.

3.4.2 Wastewater Treatment

Andersen AFB is in the GovGuam northern sewage district. Sewage from Andersen AFB is pumped off-Base to the Guam Waterworks Authority (GWA) Northern District Wastewater Treatment Plant (WWTP) in Tanguisson for treatment and disposal. The WWTP is approximately 9 miles southwest of the Base. The WWTP was commissioned in 1979 and provides primary treatment. USEPA is working with GWA on reissuing a permit that considers GWA's waiver from secondary wastewater treatment requirements under Section 301(h) of the Clean Water Act (USEPA 2006b).

National Pollutant Discharge Elimination System (NPDES) permit (GU0020141) is the existing permit for the WWTP. The WWTP is currently out of compliance with its NPDES permit under existing conditions. Non-compliance issues for effluent 5-day biochemical oxygen demand (BOD₅) and suspended solids are common occurrences. The USEPA has not reissued the permit at this time and is working with GWA on collection of additional data to facilitate

issuance of a new permit with respect to its proposed new ocean outfall. At the time of issuance of the existing permit in 1986, one of the two 6 mgd clarifiers was inoperable and therefore, USEPA would not issue a permit beyond the 6 mgd limit. It is anticipated that once the outfall improvement project is completed in 2007, USEPA will permit the treatment facility for 12 mgd (Antrobus 2006 and USEPA 2006b).

The NPDES permit currently under review by USEPA may be revised to decrease the allowable effluent concentration for BOD₅ and total suspended solids, eliminate total settleable solids concentration limitations, and add concentration limitations for aluminum, copper, nickel, and zinc. If USEPA imposes these revisions on GWA, it is likely GWA would in turn impose stricter control on influent received from Andersen AFB.

According to the USEPA, Guam has three water bodies listed as impaired on the 1998 Section 303(d) list: Agana Bay/River, Pago Bay/River, and Tumon Bay. Of these, only Tumon Bay is listed as a high priority due to its pathogen impairment. Currently there are no Total Maximum Daily Loads (TMDL) for this or any other impairment reported by Guam to the USEPA. However Guam EPA lists two additional water bodies on its 2004 303(d) List, both with a high priority ranking: Northern Guam Lens aquifer; and Ugum River. According to the Guam EPA, water bodies with a high priority ranking are targeted for TMDL. Although the Northern Guam Lens aquifer lies directly below Andersen AFB, the installation's ability to discharge its stormwater has not been affected to date (Andersen AFB 2005c).

The WWTP has a design capacity of 12 mgd and a peak flow capacity of 27 mgd, and it is anticipated that the new permit will reflect current flow projections, possibly up to its design capacity. Based on GWA's recent discharge monitoring reports, the WWTP average flow is around 9.0-9.5 mgd (Lee 2006). Based on a 9.5 mgd flow and 12 mgd design capacity, the plant is operating at approximately 79 percent of capacity.

Andersen AFB has a combined sanitary and industrial wastewater collection system. The GWA currently does not permit or restrict Andersen AFB's wastewater discharges. The Base's sewage collection system consists of approximately 530,000 linear feet of concrete, clay, cast iron, and asbestos cement pipe mains ranging from 6 to 20 inches in diameter. The collection system delivers wastewater by gravity to lift stations. There are 22 active septic tanks. There are also five grease traps and 12 oil/water separators that are periodically pumped out by service contract. The Back Gate Lift Station pumps all the collected sewage except landfill effluent to GWA for treatment and disposal. Base personnel estimate the maximum capacity of the lift station is 1.0 mgd.

Over the past 36 months, Andersen AFB has twice experienced an overflow of its wastewater collection system. Both instances occurred during typhoons which flooded a large percentage of the island. The overflows were a result of the limited infrastructure capacity to support a severe storm surge that infiltrated the wastewater collection system (Andersen AFB 2005c). The 20-inch diameter force main from the Back Gate Lift Station caused incoming sewage to back up and overflow into the adjacent storm runoff collection basin and into injection wells. The overflows also entered yards in adjacent family housing areas (USAF 2003b).

Repairs and upgrades to the wastewater pumping stations have been completed to preclude discharges to the UIC wells. New sensors were installed in the wet wells of the pumping stations to address potential overflows and timely responses to power and equipment failures. An

evaluation of the present waste water system is in progress. The evaluation includes cleaning and video taping the lines to determine the locations of piping that need to be repaired and/or upgraded.

Andersen AFB personnel monitor waste water flow rates on a monthly basis at the lift station. Based on flow records at the lift station, the Base generates approximately 0.22 mgd of sewage per day (Monecke 2006). About 95 percent of the wastewater is generated from family housing, dormitories, and office/administrative areas, and 5 percent is generated by industrial activities (Exon 2005). Based on the total generation and the percentages for non-industrial and industrial generation, personnel generation equates to about 0.209 mgd (35 gpd per person) and industrial generation is 0.011 mgd. The 0.22 mgd equates to 22 percent of capacity of the Base's lift station and about 1.8 percent of the 12 mgd design capacity of the WWTP.

GWA is funding overflow studies and other infrastructure improvements to the treatment plant, pump stations, and upgrades to sanitary sewers in the Northern District WWTP system for FY07 through FY10 to eliminate surcharges for increased system reliability. The overflow studies will assess the opportunity to modify the Route 16 pump station overflow to avoid excess wet weather flow problems along Route 1. Improvements to sewer lines from Andersen AFB and Navy housing east of the WWTP include eliminating the flow split at the plant to reduce power usage at the pump station and increase system reliability. The current system is constructed in such a way that most of the dry weather flow and approximately 50 percent of the wet weather flow is diverted to the Southern Link Pump Station. These projects are necessary to improve the existing collection and treatment system and expand the system to support Guam's economic growth. Sewer line upgrades to eliminate overflows include construction of approximately 5,100 feet of sewers upstream of the Fujita Pump Station and just downstream of flow meters in the Buena Vista area. The planned improvements and repairs, including the completion of the ocean outfall, should bring the WWTP back into compliance with the USEPA (GWA 2006).

Andersen AFB has no concentration limitations on its wastewater discharge sent to the GWA WWTP. However, the GWA WWTP does have an NPDES permit for specific constituents. If the NPDES permit for the GWA plant is revised, it is likely the GWA would impose contaminant concentration limits on the Base (Andersen AFB 2005c).

3.4.3 Energy and Communications

Energy

Andersen AFB receives its power from the Guam Power Authority (GPA). The GPA system presently has a total of 552 megawatts (MW) of power generation capacity or 522,000 kilowatt-hours (kWH) for the Island of Guam. Power for Andersen AFB and the surrounding communities is provided through three main GPA substations: Dededo Substation, Yigo Substation, and Harmon Substation (Ostil 2006a). Recent peak demand of 274 MW (259,109 kWH) occurred in May 2005 (Sherrill 2006a). Based on this demand, the GPA has an approximate 100 percent generation capacity reserve (USAF 2004c). The Base's current energy consumption is 20 MW (Ostil 2006a), or 18,913 kWH (3.6 percent of GPA generation capacity). Based on this rate, electrical consumption is 0.0027 kWH per square foot (ft²) per day when considering Base buildings contain 6.9 million square feet of space (Andersen AFB 2004a).

Air Force equipment in the Andersen AFB Substation includes two 20,000 kWH, 34.5 kV-13.8 kV outdoor, load tap changing substation transformers (T-15 and T-16). The 34.5 kV portion of the Andersen Substation has deteriorated substantially. Oil circuit breakers do not operate when a short circuit occurs, which causes a circuit breaker at the GPA power plant to trip. Any ensuing outage affects not only Andersen AFB, but also the local community. The structure and switching mechanisms have corroded due to the salt-laden air and high humidity. Different switching mechanisms have broken off when switch handles were operated, rendering the switches inoperable until repairs could be completed. Should the 34.5 kV portion of the substation continue to deteriorate, power reliability for Andersen AFB would decrease, causing outages to become more frequent and of longer duration (USAF 2004d).

An electrical utility system analysis conducted in September 2003 indicated that by the end of 2006, the tie feeder from the incoming Andersen Substation to on-Base Station D (P-66/P-70) would become overloaded. Additionally, there are some low voltage (>95%) problems at several locations. The analysis identified solutions that would eliminate both the overload and low voltage problems (USAF 2003b).

The analyses also indicated that by 2010, the Andersen Substation 1,200-amp switchgear would be loaded up to 95 percent of its capacity. Normally, switchgear should not be loaded to more than 80 percent of capacity. Replacing the existing 1,200-amp, 13.8 kiloVolt (kV) switchgear at the Main Substation with a 2,000-amp, 13.8 kV switchgear is a consideration (USAF 2003b).

Communications

The 36th Communications Squadron is responsible for communications systems at Andersen AFB. The primary communications hub for telephone service is located in Building 25008, and there are approximately seven primary Independent Telecom Nodes on Base. There are no significant problems or capacity issues with the current Base communications system according to the 36th Communications Squadron. The system is presently meeting the immediate needs of the Base even as it implements the Combat Information Transport System (CITS), which would also improve both capacity and reliability. However, to accomplish missions in the future and accommodate mission growth, the Base would continue to implement communications system expansions and improvements (USAF 2004c).

3.4.4 Storm Water Management

Guam is in a tropical environment that receives an estimated 100 inches of rainfall each year. As a result, the island has unique stormwater discharge requirements. Andersen AFB is relatively flat, and heavy precipitation generally flows by sheets into swales, then into sink holes or other depressions, where it percolates into the ground or is channeled into stormwater wells. The Base sits on over 17,500 acres and is divided into 20 drainage basins that contain over 103 dry injection wells in karst terrain that use the porous limestone bedrock to assist in storm water migration into the aquifer (USAF 2004b). Andersen AFB has Underground Injection Control (UIC) permits for these injection wells which inject an estimated 130 mgd of stormwater into the aquifer system. The Base does not meter the flow into these wells (Andersen AFB 2005c). Twelve of the wells are sampled twice a year to ensure that water entering the

wells meets drinking water standards. The Base has accomplished projects such as constructing an overflow basin and reconfiguration of the well heads to protect the wells (Clark 2005). The Base is currently upgrading the UIC well system to accommodate the increase in stormwater runoff. New designs incorporate devices to increase ponding and retention (pretreatment) while maximizing capacity.

The subsoil throughout Andersen AFB is composed of highly porous limestone covered with a soil layer generally less than 2 feet thick. Percolation rates are high, generally from 8 to 24 feet per day. Because of the high permeability of the limestone substrate, no perennial streams exist on the northern end of Guam (USAF 2000).

It is estimated there are approximately 578 acres of impervious cover on Andersen AFB; 302 acres from airfield pavements, 115 acres from buildings, and 161 acres from roadways and parking lots. This estimate does not include all the primary roadways on the Base.

Storm water at Andersen AFB is managed in accordance with the Base's Storm Water Pollution Prevention Plan (SWPPP), which establishes procedures that minimize the potential for storm water pollution from Base activities, including construction.

3.4.5 Solid Waste Management

Municipal solid waste at Andersen AFB is managed in accordance with guidelines specified in AFI 32-7042, *Solid and Hazardous Waste Compliance*, AFI 32-7080, *Pollution Prevention Program*, and the Base's Solid Waste Management Plan. The AFI incorporates by reference, the requirements of Subtitle D, 40 CFR, Parts 240 through 244, 257, and 258, and other applicable federal regulations, AFIs, and DoD Directives. In general, AFI 32-7042 establishes the requirement for installations to have a solid waste management program to incorporate the following: a solid waste management plan; procedures for handling, storing, collecting, and disposing solid waste; record-keeping and reporting; and pollution prevention.

Non-hazardous municipal solid waste (MSW) at Andersen AFB is either recycled or disposed in an on-Base landfill an average of 6 days per week (312 days per year). Andersen AFB personnel operate and maintain the Base landfill. The original landfill has been capped to contain environmental contamination within its confines. The new landfill is on top of the old landfill, the cap of which serves as a lining for the new landfill (USAF 2003b).

The landfill was opened in 1998 and had a 10-year life expectancy based on a design to accommodate 172,000 cubic yards (CY) of debris (estimated at 34,658 tons based on 403 pounds per CY). As of June 2005, about 254,000 CYs of debris (51,181 tons) were disposed in the landfill. The Base reevaluated the landfill design and the result is the landfill can accommodate 330,000 CYs (66,495 tons), or an additional 76,000 CYs (15,314 tons). The report of the reevaluation indicated the landfill could accommodate MSW at the current disposal rate of 2,750 CY per month (554 tons) through December 2007. The report stated that the disposal rate of 2,750 CY per month is attainable if recycling and composting are employed to the maximum extent possible, if soil cover material is applied as sparingly as possible, if typhoon debris is discounted, and if significant waste stream increases are not experienced due to outside events (Black and Veatch 2005). Additionally, a study is currently being conducted to investigate the possibility of vertically extending the current landfill beyond 2009. The study is scheduled for completion in January 2007.

Based on the disposal rate of 2,750 CYs per month, a total of approximately 23.1 tons per day (tpd) are disposed in the landfill. Using an on-Base population of 5,900 and an average generation rate of 2.5 pounds of MSW per person per day, a total of 7.4 tpd of waste would be generated. This equates to a personal MSW generation rate of approximately 2,309 tons per year (tpy) (192 tons per month) based on 6 days per week. Therefore, approximately 362 tons per month ($554 - 192 = 362$ tons) of other debris are disposed in other designed cells of the landfill.

The Base operates its solid waste disposal program under three permits from GovGuam. Permit 99-1001 LF is for MSW generated by residential and mission activities. The second permit (02-68 HFL) includes construction and demolition debris such as dirt, rock, concrete, asphalt, and reinforcement bars. The third permit (99-1003 PRO) covers recycling operations. Permits 99-1001LF and 99-1003 PRO expired in May 2004, and permit 02-68 HFL expired in October 2004. Andersen AFB submitted a 5-year renewal application to GovGuam for each permit on April 10, 2004, but has not yet received comments on the applications. However, GovGuam informed the Base it is permitted to continue operation even though the Base has not heard from the agency as of August 2006. Based on the process, the permits should be valid until April 2009 (Gingras 2005). Andersen AFB is working with Guam EPA to issue the landfill permits.

Andersen AFB implemented an aggressive pollution prevention program in accordance with AFI 32-7080, *Pollution Prevention Program*, that recycles as much of the solid waste stream as possible. The Base program diverts solid waste by grinding and reusing asphalt, concrete, construction and demolition debris, and wood/yard waste. Other debris (e.g., scrap metal, reinforcement bars, conduit, piping, cardboard, and plastics) is recycled (Gingras 2005). All green waste is segregated and collected for mulching, chipping, and composting (Andersen AFB 2005c). The Base currently recycles white bond paper, newspaper, magazines, aluminum, glass, cardboard, and will soon be recycling plastics under the residential recycling program. The average recycling rate for residential MSW is 75 tons per month.

A recycling contractor picks up aluminum, cardboard, and wastepaper from two drop-off locations on the Base: the service station and the Self-Help Store. Additionally, large recycle bins are located at each military family housing unit for easy collection of household recyclables. A policy to establish recycling in all unaccompanied dormitories and other locations on Base was also begun. There are currently over 69 outdoor recycling containers located throughout the entire Base. As much as 1,800 tons are collected each year at Andersen AFB. Due to the amount of green waste generated, the Base built a green waste and composting area. Within this area a large chipper/grinder is utilized to mulch green waste into compostable material. The grinder is used for green waste and wood pallets with the sole purpose of decreasing the amount of solid waste entering the landfill, well over 320 tons of green waste.

There are no other USEPA-permitted Resource Conservation and Recovery Act (RCRA) Subtitle D sanitary landfill facilities on the island of Guam. However, the Navy has a permitted landfill approximately 30 miles south of Andersen AFB (Andersen AFB 2005c).

GovGuam is also in the process of siting a new sanitary landfill. GovGuam, through the Guam Department of Public Works and Guam EPA, is proposing to construct a MSW Landfill Facility in the Layon area of Dandan, Inarajan, approximately 40 miles south of Andersen AFB. The creation of the new sanitary landfill is part of the terms of the Ordot Consent Decree (signed

in 2004 by USEPA, U.S. Department of Justice, and GovGuam), and requires GovGuam to close the Ordot Dump and resolve the issues related to the unauthorized discharge of pollutants from the dump into the Lonfit River (Andersen AFB 2005c). The new, fully compliant Guam sanitary landfill is planned to be on line in 2009 or 2010 (Spoerer 2006). The only other fully compliant landfill facility within the Pacific is on the Island of Saipan, approximately 120 miles north of Guam (Andersen AFB 2005c).

3.4.6 Transportation System

Access to Andersen AFB is from Highway 1 which leads to the main base. Alternative routes are provided by Highway 15 leading to the Santa Rosa Gate, which is located south of Andersen main base. Figure 2.2-2 shows the primary roads and road numbers for the area outside Andersen AFB. The primary roads within Andersen AFB include Arc Light Boulevard, Santa Rosa Boulevard, Caroline Avenue, and Bonnis Boulevard. The secondary and local roadway systems at Andersen AFB provide access from the primary routes to various installation facilities. Parking is generally adequate throughout the Base, and the existing transportation system is adequate to meet present needs (USAF 2004b).

Draft EIS Comment: Routes 1, 15 and 3 now experience heavy traffic and should be a consideration in the Environmental Impact Assessment.

Response: Subchapter 3.4.6 was improved by considering and further analyzing the issues in this comment by using data from an August 2006 draft report of a traffic study that quantified peak time traffic volumes at the intersection of Arc Light Boulevard and Routes 1 and 9 and along Route 9 where the Commercial Gate would be constructed. These recent data were used to revise the analysis in Subchapters 4.4.1.6, 4.4.2.6, and 4.4.5.

The Main Gate at Andersen AFB is located along Arc Light Boulevard just north of the intersection of Highway 1 and Guam Route 9. This gate is open 24 hours a day, 7 days a week. A traffic study for the Main Gate and Route 9, which included the intersection of Route 9 and the proposed Commercial Gate, was accomplished in June 2006 (Austin, Tsutsumi & Associates 2006). Figure 3.4-1 presents the existing traffic volumes and level of service (LOS) at the intersection of Arc Light Boulevard and Highway 1 and Route 9 for the morning (6:30-7:30 a.m.) and afternoon (3:30-4:30 p.m.) peak hours of traffic. The figure also depicts the volume of traffic for the section of Route 9 where the Commercial Gate is proposed to be constructed. The report of the traffic study states that, overall, the intersection operates at

LOS B (see below) during both the morning and afternoon peak hours of traffic (Austin, Tsutsumi & Associates 2006).

Level of service is a qualitative measure used to describe the conditions of traffic flow, with values ranging from free flow conditions at LOS A to congested conditions at LOS F. Following are descriptions of LOS.

- LOS A occurs when traffic flows at or above the posted speed limit and all motorists have complete mobility between lanes.
- LOS B is slightly more congested, with some impingement of maneuverability; two motorists might be forced to drive side by side, limiting lane changes. LOS B does not reduce speed from LOS A.
- LOS C has more congestion than B, where ability to pass or change lanes is not always assured. LOS C is the target for urban highways in many places. At LOS C most

experienced drivers are comfortable, roads remain safely below but efficiently near capacity, and posted speed is maintained.

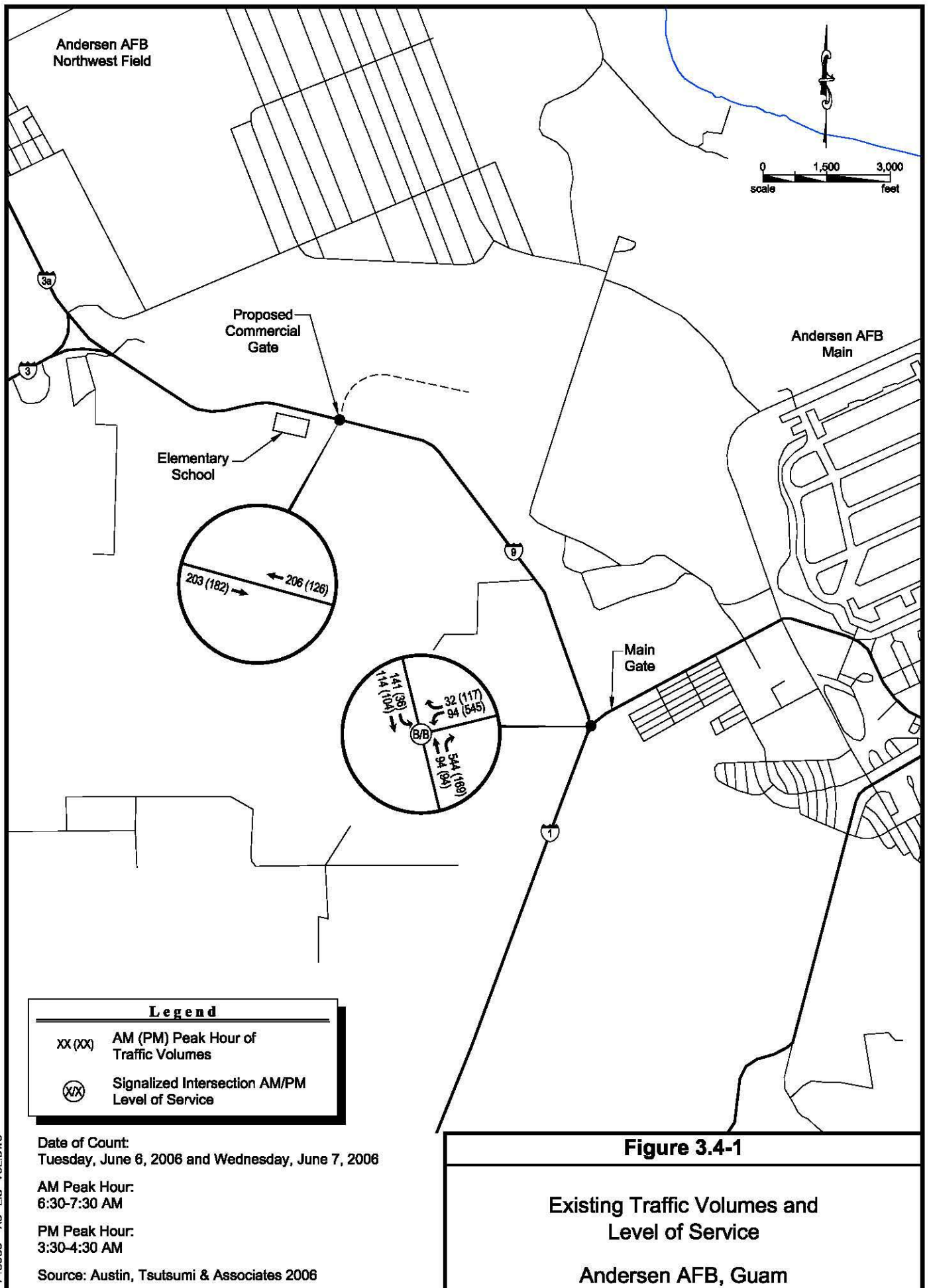
- LOS D is the level of service of a busy shopping corridor in the middle of a weekday, or a functional urban highway during commuting hours: speeds are somewhat reduced, motorists are hemmed in by other cars and trucks.
- LOS E is a marginal service state. Flow becomes irregular and speed varies rapidly, but rarely reaches the posted limit.
- LOS F is the lowest measurement of efficiency for a road's performance. Flow is forced; every vehicle moves in lockstep with the vehicle in front of it, with frequent drops in speed to nearly zero miles per hour.

3.5 BIOLOGICAL RESOURCES

3.5.1 Vegetation

Historic Vegetation / Primary Growth Limestone Forest

Historically, tree species in the native forest of Guam would have been broadly classified based on underlying soil type, the northern limestone vegetation, and the southern volcanic vegetation (Fosberg 1960; Donnegan, *et al.* 2004). Andersen AFB is entirely within the northern limestone vegetation area. The northern half of Guam is generally flat limestone with abrupt cliffs and drop-offs toward the ocean. The underlying limestone may be strongly weathered into a karst formation, and the vegetation would typically have been forests. The primary growth limestone forest of the northern portion of Guam was a tall, closed canopy forest dominated by very large *Artocarpus mariannensis* (dugdug) and *Ficus prolixia* (nunu) trees. In addition, several other species were probably well-represented throughout the plant community, including *Elaeocarpus joga* (yoga), *Instia bijuga* (ifit), *Neisosperma oppositifolia* (fagot), *Tristiropsis obtusangula* (faniok), and *Pisonia grandis* (umumu) (Fosberg 1960). Throughout northern Guam, these species would have formed a nearly contiguous canopy 15 to 20 meters (66 feet) tall. However, typhoon winds may blow down clusters of trees, making gaps in the forest canopy where understory vegetation could proliferate and seedlings of canopy species could germinate (Andersen AFB 2003c; Quinata 1994). The modified forest that regenerated after typhoons were historically composed of a denser understory vegetation, including ferns, herbaceous vegetation, and small shrubby species (Quinata 1994) which supported native bird and animal species. Some portions of northern Guam still contain forests that can be considered primary growth forest and typhoon-modified forest (Fosberg 1960; Quinata 1994; Lujan 2005). Table 3.5-1 lists plants present within the ASA and Commercial Gate project areas known to have occurred within the historical forested areas of Northern Guam.



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Table 3.5-1 Historical Forest Plant Species within the ASA and Commercial Gate Project Areas

English Common Name ¹	Chamorro Common Name ¹	Scientific Name ²	Growth Habit	Listing Status (F = Federal G = Guam)	Native or Introduced species	Present in Project Areas ³
Mexican Creeper		<i>Antigonon leptopus</i>	Vine		Introduced	Yes
Breadfruit	Dogduk, Dukduk	<i>Artocarpus mariannensis</i>	Tree		Native	-
fish poison tree	Putting	<i>Barringtonia asiatica</i>	Tree		Introduced	-
Beggar's tick		<i>Bidens alba</i>	Herbaceous		Introduced	Yes
Wait-a-bit	Pakao	<i>Caesalpinia major</i>			Introduced	Yes
Ironwood, Australian Pine	Gagu	<i>Casuarina equisetifolia</i>	Tree		Native	-
China Inkberry	Tintanchina	<i>Cestrum diurnum</i>	Shrub		Introduced	Yes
Night-flowering cestrum		<i>Cestrum nocturnum</i>	Shrub		Introduced	Yes
Jack in the bush	Kesengasil	<i>Chromolaena ordata</i>	Shrub		Introduced	Yes
Cycad	Fandang	<i>Cycas circinalis</i>	Tree		Native	Yes
Yoga trees	Ghumar	<i>Elaeocarpus joga</i>	Tree		Native	Yes
Goosegrass	-	<i>Eleusine indica</i>	Grass		Introduced	Yes
Banyon, Strangling fig	Nunu	<i>Ficus prolixia</i>	Tree		Native	Yes
Dyer's fig	Hodda, Hoda	<i>Ficus tinctoria</i>	Tree		Native	-
	Paipai	<i>Guamia mariannae</i>	Tree		Native	Yes
Heritiera tree	Ufa halomtano	<i>Heritiera longipetiolata</i>	Tree	F=none G=Endangered	Native	-
Hibiscus tree	Pago	<i>Hibiscus tiliaceus</i>	Tree		Native	Yes
Ifil	Ifit	<i>Instia bijuga</i>	Tree		Native	Yes
Oceanblue Morning glory		<i>Ipomoea indica</i>	Vine		Introduced	Yes
Lantana		<i>Lantana camara</i>	Shrub		Introduced	Yes
False koa, Lead tree	Tangan-tangan	<i>Leucaena leucocephala</i>	Tree		Introduced	Yes
Mile-a-Minute weed		<i>Mikania micrantha</i>	Vine		Introduced	Yes
Sensitive plant		<i>Mimosa pudica</i>	Shrub		Introduced	Yes
Swordgrass		<i>Miscanthus floridulus</i>	Grass		Native	Yes
Noni	Lada	<i>Morinda citrifolia</i>	Shrub, tree		Native	Yes
Calabur-tree, calabura	mansanita	<i>Muntingia calabura</i>	Tree		Introduced	-
	Fagot, Fago	<i>Neisosperma oppositifolia</i>	Tree		Native	Yes
Swordfern		<i>Nephrolepis exaltata</i>	Fern		Introduced	Yes
paper rose	alalag	<i>Operculina ventricosa</i>			Introduced	-

Table 3.5-1 Historical Forest Plant Species within the ASA and Commercial Gate Project Areas (*continued*)

English Common Name ¹	Chamorro Common Name ¹	Scientific Name ²	Growth Habit	Listing Status (F = Federal G = Guam)	Native or Introduced species	Present in Project Areas ³
Screw Pine, Pandanus	Pahong	<i>Pandanus dubious</i>	Tree		Native	-
	Kafu, Fatsao	<i>Pandanus tectorius</i>	Tree		Native	Yes
Scarlet-fruited Passion Flower	Kinahulo Atadao	<i>Passifolia foetida</i>	Vine		Introduced	-
Wild Passion Flower		<i>Passifolia suberosa</i>	Vine		Introduced	Yes
Elephant grass		<i>Pennisetum purpureum</i>	Grass		Introduced	Yes
	Umumu	<i>Pisonia grandis</i>	Tree		Native	Yes
False elder	Ahgao	<i>Premna obtusifolia</i>	Shrub		Native	Yes
Fire tree	Hayun lagu	<i>Serianthes nelsonii</i>	Tree	F=Endangered G=Endangered	Native	-
False verbena		<i>Stachytarpheta cayennensis</i>	Herbaceous		Introduced	Yes
No recorded English Common Name		<i>Tabernaemontana rotensis</i>	Tree	F=none G=Locally Rare	Native	Yes
Limeberry	Lemondichina	<i>Triphasia trifolia</i>	Shrub		Introduced	Yes
	faniok	<i>Tristiropsis obtusangula</i>			Native	Yes
Vitex	Lagundi	<i>Vitex parviflora</i>	Herbaceous		Introduced	Yes

¹Common English and Chamorro names taken from: Lee (1985); Moore and McMakin 2005, and Raulerson and Rinehart (1991)

²Names organized alphabetically by scientific name.

³Presence in Project Areas based on January 2006 surveys (Parsons 2006)

Secondary Growth Limestone Forest

- Historic actions on the northern half of Guam about 60 years ago included clearing the native limestone forest of trees, understory, and shrubs, and grading the surface. Imported fill of crushed coral and argillaceous clay was placed and compacted over pulverized limestone to stabilize runways, taxiways, and aprons (USAF 2000). The area cleared included most of what is now Andersen AFB. The two airfields constructed on Guam were Northwest Field and North Field. Andersen main, including the North Field area, has remained active, with most of its operations and support facilities being in developed areas maintained as an urban landscape.

After clearing, the forest understory was also subject to invasion by non-native plant species, including *Bidens alba*, *Chromolaena odorata* (kesengasil), *Stachytarpheta cayennensis*, *Ipomaea indica*, *Passifolia foetida* (kinahulo), *Passifolia suberosa*, *Operculina ventricosa* (alalag), *Cestrum diurnum* (tintanchina), *Muntingia calabura* (mansanita), *Triphasia trifolia* (lemondichina), *Leucanea leucocephala* (haole koa), and *Caesalpinia major* (pakao). Woody species such as *L. leucocephala* quickly formed a major component of open xeric areas, and

Vitex parviflora (lagundi) dominated upper and mid-canopies of denser forests (Fosberg 1960; Space and Falanruw 1999).

Further, invasive ungulate species greatly reduced recruitment of native limestone woody species into the upper canopy, thereby altering forest composition and structure. For example, in 2005, Wiles identified ungulate pressure as the major factor for inhibiting recruitment of the native *Artocarpus mariannensis* tree (Wiles 2005). Wiles documented a decrease in *Artocarpus mariannensis* trees within MSA 1 from 549 individual trees in 1989, to 190 trees in 1999, a 65.4 percent decrease. In MSA 1, ungulate densities were reported to be 183 Philippine deer (*Cervus mariannus*) per square kilometer, and 38 feral pigs (*Sus scrofa*) per square kilometer (Brooke 2005; Knutson and Vogt 2002). Other native trees in secondary forests that are declining due to lack of recruitment include the *S. nelsonii* (hayun lagu), *E. yoga*, *Heritiera longipetiolata* (ufa halomtano), *P. grandis*, *Barringtonia asiatica* (puting), *T. obtusangula*, and *I. bijuga* (Wiles, *et al.* 1995; Wiles 2005; Schreiner 1997; GovGuam DAWR 2005).

The introduced Brown tree snake (*Boiga irregularis*) indirectly affected forest composition and structure by eliminating a many forest bird species (Savidge 1987). Birds and fruit bats are important in secondary limestone forests because they naturally pollinate and disperse seeds of shrubs and trees and thereby help maintain forest diversity (Wiles *et al.* 1995; Cox and Elmquist 2000), contributing to recovery after typhoons and perturbations. The loss of most insectivorous birds may leave secondary limestone forests vulnerable to a variety of insect pests. With the absence of insect predators, insects arriving on Guam in ships or planes are potentially more likely to become established and threaten native woody species.

Among introduced invertebrates affecting secondary limestone forest species, the introduced Asian cycad scale (*Aulacaspis yasumatsui*) has effectively removed the native *Cycas circinalis* (fandang) from mid and lower canopies, where it once was a dominant tree species. This scale was first noted in Guam in 2003; *C. circinalis* suffers a mortality rate of 100 percent in infected areas (Moore 2005).

Intact Forested Areas

There are tracts of land adjacent to the cliff lines that have not been extensively modified, possibly because the karst topography and steep cliffs made the area difficult to clear and of doubtful purpose. These areas contain some of the best species composition and structure found in the primary growth limestone forest that once covered now-cleared areas of Guam, and are now considered Natural Areas that are protected from future human disturbance (*e.g.*, construction and development). Due to its proximity to Andersen main, Pati Point Natural Area is one area of special concern. The vegetation communities of Pati Point can most accurately be described as *F. prolixa* forests, with tall canopy trees. Other species may include *Mammea odorata* (chopak) and *N. oppositifolia* (USFWS 1990a). Additional vegetation communities include forest types dominated by *M. odorata* along the cliff line, and *N. oppositifolia* forest toward Tarague Basin. The Pati Point Natural Area is also directly under a current flight line from Andersen AFB.

Vegetation Survey for the ASA and Commercial Gate Project Areas

Vegetation surveys conducted in January 2006 (Parsons 2006) provided vegetation community type descriptions within the ASA and Commercial Gate project areas. These

vegetation community types are associated with secondary growth limestone forests, as well as a herbaceous-dominant vegetation community. Vegetation community types observed are at a successional state resulting from a variety of past natural and human-induced perturbations, including browse pressure from ungulates and lack of pollinator birds that were effectively removed by BTS. Forest community types are still subject to natural perturbations, particularly typhoons, as evidenced by the many blowdowns of trees that have rooted in shallow soil and partial canopy defoliation.

Fosberg's classification (1960) of primary and secondary limestone forest set the baseline for the description of Guam's forests. Secondary limestone forests may be classified into secondary woody limestone community, secondary shrubby limestone community, and herbaceous scrub. Based on published descriptions (Donnegan, *et al.* 2004) and discussions with local conservation personnel familiar with the vegetation at Andersen main (Lujan 2005), the two secondary growth woody limestone communities are classified into the following vegetation community types (named by the dominant species): *Aglaia-Guamia* Forest, *Neisosperma* – *Macaranga* Forest, *Guamia* Forest, *Guamia* – *Premna* Forest, and *Vitex* – Remnant *Elaeocarpus* Forest. The secondary shrubby limestone community can be further classified as a *Hibiscus-Leucaena* shrub community type. Herbaceous scrub vegetation community is characterized by a dominant herbaceous species such as dense stands of *C. diurnum*, *B. alba*, *C. odorata*, *S. cayennensis*, with occurrences of *H. tiliaceus*, *Morinda citrifolia* (lada), *T. trifolia*, *P. tectorius* and *P. dubious*. For the purposes of this EIS, the herbaceous scrub community was not classified further into community types, although herbaceous-dominant areas are heterogeneous.

Table 3.5-2 identifies woody and sapling species of vegetation community types within the ASA and Commercial Gate project areas. Vegetation community types relevant to the ASA project area are shown in Figure 3.5-1, and vegetation community types relevant to the Commercial Gate project area are shown in Figure 3.5-2. Methods used in vegetation surveys involved circular quadrat sampling techniques and are described in detail in Appendix E. Mapping efforts were aided by comparing recent high resolution multi-spectral imagery acquired by the QuickBird Satellite (DigitalGlobe: 2.6-meter resolution and Panchromatic imagery: 0.6-meter resolution) to field data and ground conditions.

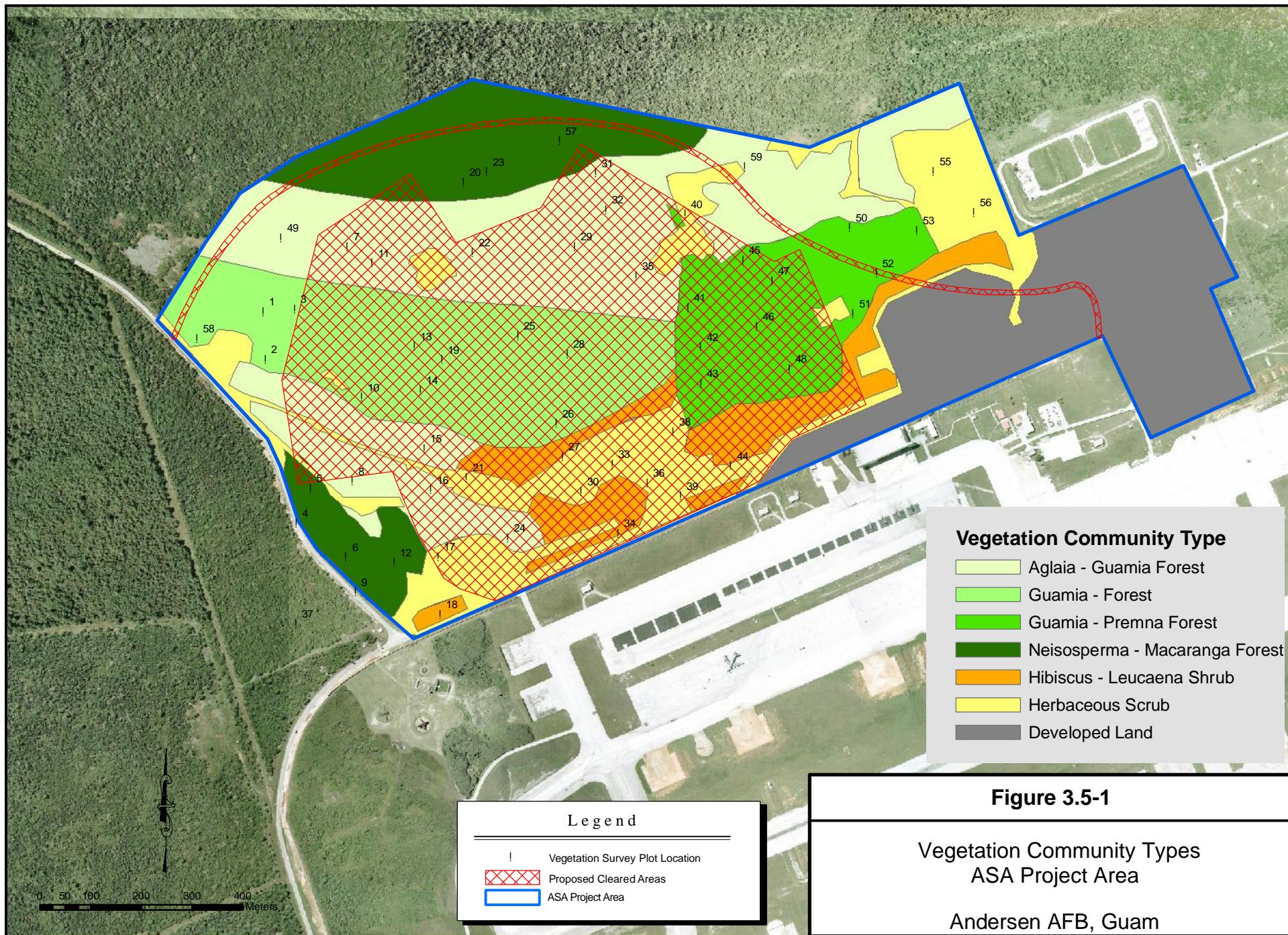
Table 3.5-2 Vegetation Community Types and Clearing Activities Within the ASA and Commercial Gate Project Areas

Vegetation Community Type	Woody Species Observed Within Plots	Woody Sapling Species Observed Within Plots	Total Area Subject to Clearing Hectares/Acres
Aglaia – Guamia Forest	<i>Aglaia mariannensis</i> <i>Guamia mariannae</i> <i>Cycas circinalis</i> <i>Ficus prolixa</i> <i>Hibiscus tiliaceus</i> <i>Eugenia thompsonii</i> <i>Morinda citrifolia</i> <i>Neisosperma oppositifolia</i> <i>Maytenus thompsonii</i> <i>Mammea odorata</i> <i>Tabernaemontana rotensis</i>	<i>Aglaia mariannensis</i> <i>Caesalpinia major</i> <i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Ixora coccinea</i> <i>Neisosperma oppositifolia</i> <i>Pandanus tectorius</i> <i>Triphasia trifolia</i>	20.5 / 50.7

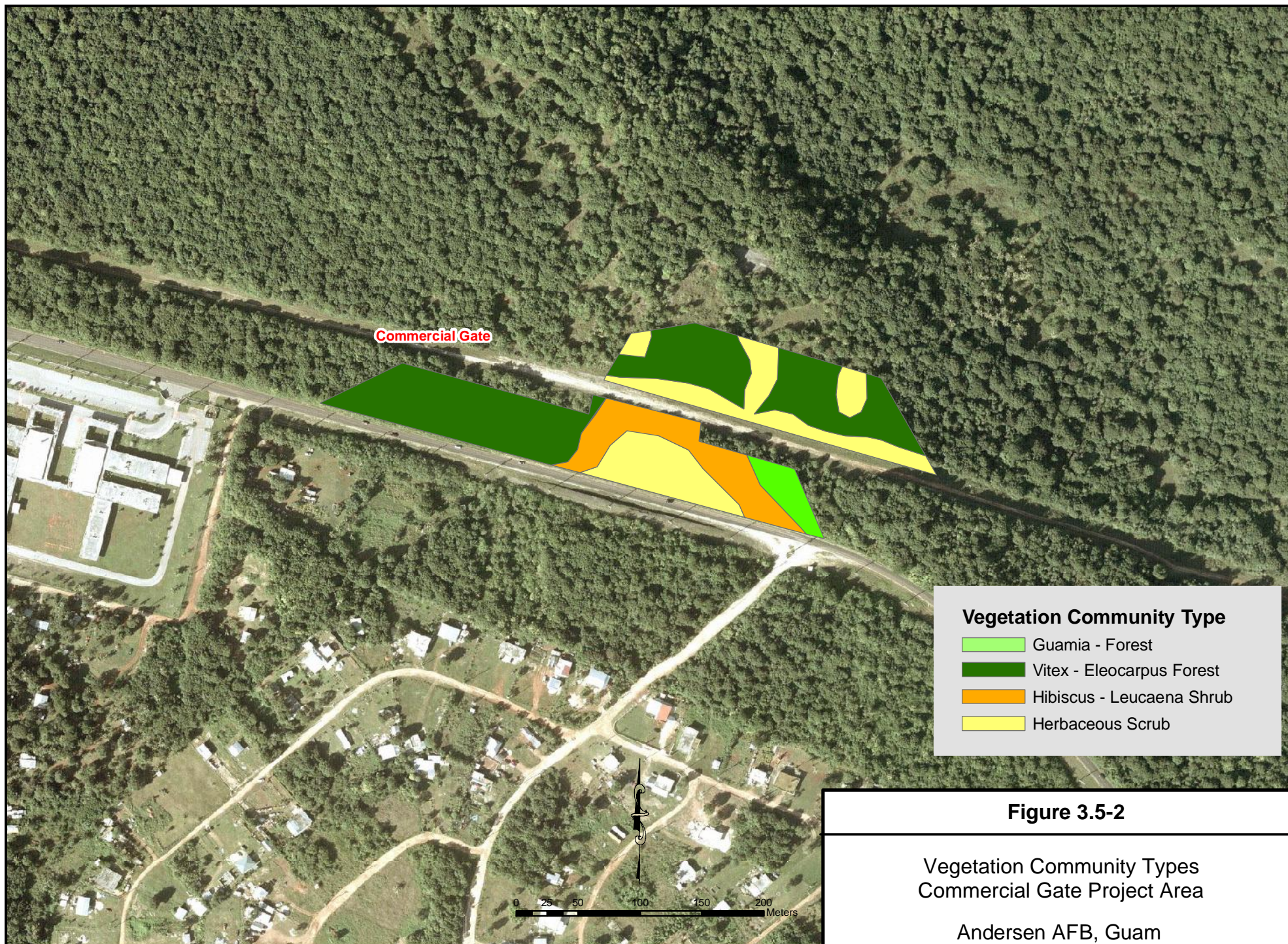
Table 3.5-2 Vegetation Community Types and Clearing Activities (*continued*)

Vegetation Community Type	Woody Species Observed Within Plots	Woody Sapling Species Observed Within Plots	Total Area Subject to Clearing Hectares/Acres
Guamia Forest	<i>Guamia mariannae</i> <i>Aglaia mariannensis</i> <i>Hibiscus tiliaceus</i> <i>Cycas circinalis</i> <i>Neisosperma oppositifolia</i> <i>Psychotria mariana</i>	<i>Aglaia mariannensis</i> <i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Neisosperma oppositifolia</i> <i>Pandanus tectorius</i> <i>Triphasia trifolia</i>	17.6 / 43.5
Herbaceous Scrub	<i>Morinda citrifolia</i> <i>Pandanus tectorius</i> <i>Hibiscus tiliaceus</i> <i>Triphasia trifolia</i>	<i>Morinda citrifolia</i> <i>Pandanus tectorius</i> <i>Hibiscus tiliaceus</i> <i>Triphasia trifolia</i>	16.4 / 40.5
Neisosperma – Macaranga Forest	<i>Guamia mariannae</i> <i>Macaranga thompsonii</i> <i>Neisosperma oppositifolia</i> <i>Aglaia mariannensis</i> <i>Hibiscus tiliaceus</i> <i>Eugenia thompsonii</i> <i>Cycas circinalis</i> <i>Ficus prolixa</i> <i>Premna obtusifolia</i> <i>Morinda citrifolia</i> <i>Intsia bijuga</i> <i>Psychotria mariana</i> <i>Maytenus thompsonii</i> <i>Mammea odorata</i> <i>Pandanus tectorius</i>	<i>Aglaia mariannensis</i> <i>Flagellaria indica</i> <i>Eugenia thompsonii</i> <i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Leucaena leucocephala</i> <i>Macaranga thompsonii</i> <i>Neisosperma oppositifolia</i> <i>Pandanus fragrans</i> <i>Pandanus tectorius</i> <i>Premna obtusifolia</i> <i>Tabernaemontana rotensis</i> <i>Triphasia trifolia</i>	1.4 / 3.5
Hibiscus – Leucaena Shrub	<i>Hibiscus tiliaceus</i> <i>Leucaena leucocephala</i> <i>Pandanus tectorius</i> <i>Aglaia mariannensis</i> <i>Cycas circinalis</i>	<i>Aglaia mariannensis</i> <i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Leucaena leucocephala</i> <i>Morinda citrifolia</i> <i>Pandanus tectorius</i> <i>Triphasia trifolia</i>	7.2 / 17.8
Guamia – Premna Forest	<i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Aglaia mariannensis</i> <i>Premna obtusifolia</i> <i>Neisosperma oppositifolia</i> <i>Cycas circinalis</i> <i>Ficus prolixa</i> <i>Macaranga thompsonii</i> <i>Maytenus thompsonii</i> <i>Eugenia thompsonii</i> <i>Pandanus tectorius</i> <i>Triphasia trifolia</i>	<i>Aglaia mariannensis</i> <i>Cycas circinalis</i> <i>Eugenia thompsonii</i> <i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Leucaena leucocephala</i> <i>Pandanus tectorius</i> <i>Premna obtusifolia</i> <i>Tabernaemontana rotensis</i> <i>Triphasia trifolia</i>	9.0 / 22.2
Vitex – Remnant <i>Elaeocarpus</i> Forest	<i>Guamia mariannae</i> <i>Vitex parviflora</i> <i>Cycas circinalis</i> <i>Neisosperma oppositifolia</i> <i>Premna obtusifolia</i> <i>Pandanus tectorius</i>	<i>Aglaia mariannensis</i> <i>Elaeocarpus joga</i> <i>Guamia mariannae</i> <i>Neisosperma oppositifolia</i> <i>Pandanus tectorius</i> <i>Triphasia trifolia</i> <i>Vitex parviflora</i>	1.8 / 4.4
TOTAL			73.9 / 182.6

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- Vegetation Community Type**
- Guamia - Forest
 - Vitex - Eleocarpus Forest
 - Hibiscus - Leucaena Shrub
 - Herbaceous Scrub

Figure 3.5-2

Vegetation Community Types
Commercial Gate Project Area

Andersen AFB, Guam

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3.5.2 Wildlife

3.5.2.1 Terrestrial Introduced Species

There are several vertebrate species that are not adversely affected by the urban environment and altered vegetation structure comprising most of Andersen AFB. These invasive, non-native species include: black drongo, black francolin, Eurasian tree sparrow, Philippine turtle dove, feral chickens, shrews, roof rats, and house mice. One native species, the yellow bittern, is also locally abundant and not sensitive to the altered environments. Several small reptiles and a single amphibian species also inhabit suitable areas within the modified forest on Northwest Field, and include the native Blue-tailed skink, native House geckos, and non-native curious skinks. An introduced snake species, the Brahminy blind snake, is also known to occur and was found during previous surveys. The introduced marine toad occurs throughout the area (Fritts and Rodda 1998; USAF 2000). See Table 3.5-3 for a complete list of English common names, Chamorro common names, and scientific names.

Table 3.5-3 English Common Names, Chamorro Common Names, and Scientific Names of Animal Species Present at Andersen AFB

English Common Name ¹	Chamorro Common Name ¹	Scientific Name ²	Native or Introduced species	Game species?
Mammals				
Philippine deer	Binadu	<i>Cervus mariannus</i>	Introduced	Yes
feral pigs	babuen hãlomtãno'	<i>Sus scrofa</i>	Introduced	Yes
feral house cats		<i>Catus catus</i>	Introduced	No
feral dogs		<i>Canis familiaris</i>	Introduced	No
shrews	Chã'ka	<i>Suncus murinus</i>	Introduced	No
black rat	Chã'ka	<i>Rattus rattus</i>	Introduced	No
house mouse	Chã'ka	<i>Mus musculus</i>	Introduced	No
Reptiles and Amphibians				
Monitor Lizard	Hilitai	<i>Varanus indicus</i>	Introduced	No
Brown tree snake	Kulepbla	<i>Boiga irregularis</i>	Introduced	No
Blue-tailed skink	achi'ak	<i>Emoia caeruleocauda</i>	Native	No
House geckos		<i>Hemidactylus frenatus</i>	Native	No
curious skinks	achi'ak	<i>Carlia ailanpalai</i>	Introduced	No
Brahminy blind snake	ulo' ättelong	<i>Ramphotyphlops braminus</i>	Introduced	No
marine toad	Tot	<i>Bufo marinus</i>	Introduced	No

Table 3.5-3 English Common Names, Chamorro Common Names, and Scientific Names of Animal Species Present at Andersen AFB (*continued*)

English Common Name ¹	Chamorro Common Name ¹	Scientific Name ²	Native or Introduced species	Game species?
Birds				
black drongo	Salin Taiwan	<i>Dicrurus macrocercus</i>	Introduced	No
black francolin		<i>Francolinus francolinus</i>	Introduced	Yes
Eurasian tree sparrow	Ga'ga' pale'	<i>Passer montanus</i>	Introduced	No
Philippine turtle dove	Paluman Senesa	<i>Streptopelia bitorquata</i>	Introduced	No
feral chickens		<i>Gallus gallus</i>	Introduced	No
yellow bittern	Kakkak	<i>Ixobrychus sinensis</i>	Native	No

¹ English and Chamorro names taken from <http://www.guamdawr.org/>

² Table does not include threatened or endangered species

There are two introduced reptiles that are considered top predators: the monitor lizard, a reptile whose origin on Guam appears to be tied to the first settlements by humans, and the brown tree snake. Monitor lizards are more prevalent in forested regions of Andersen AFB. In addition to these reptiles, top predators also include domestic and feral house cats and feral domestic dogs, with additional predator pressure from rats.

The BTS was probably introduced to Guam as a passive stowaway in a military cargo ship moving material after World War (WW) II. The snakes' historic range includes portions of Indonesia, New Guinea, the Solomon Islands, and Australia (Rodda, *et al.* 1999). The BTS encountered an abundant prey base in Guam as well as an absence of natural predators and pathogens. The population of native forest birds and bats has declined on Guam because of the BTS (Savidge 1987; Wiles 1994) and loss of habitat from expanding agriculture and urban development (GovGuam DAWR 2005). The BTS is directly responsible for extinction or local extirpation of 11 of 18 native bird species throughout the Island of Guam, and five native birds (of 18) have experienced population declines of greater than 90 percent and are not recovering (Wiles, *et al.* 2003). In addition to native birds, three of 12 native lizards on Guam have been extirpated, and native bat species are heavily impacted by the BTS (Wiles, *et al.* 2003; GovGuam DAWR 2005). As the range of the BTS expanded, the decline of bird species has been particularly dramatic, with a rapid decline of several common native bird species occurring over a 1 to 3-year period during the early to middle 1980s (Wiles, *et al.* 2003). BTSs have been reported at densities as high as 40 individuals per acre of forest in a formerly used and now abandoned housing area south of Andersen AFB (Vice 2005). BTSs can bear two clutches of eggs per year, each clutch typically containing four to eight eggs (Vice 2005). Larger snakes prefer warm-blooded prey, especially birds and rodents. As birds, in particular, have become more scarce in forests, several extremely abundant non-indigenous lizards have supplemented the prey base. The BTS is a nocturnal species commonly found in trees, caves, and near limestone cliffs, but may move to the ground to forage during the night, probably for abundant skinks. They do not tend to occur in open grassy areas, but will cross unpaved roads and may occur in sparsely forested areas (Tobin, *et al.* 1999). The ecological impact of the BTS on Guam

has been catastrophic, and is the single greatest terrestrial ecological threat to all of the Mariana Islands and Hawaii (Engeman and Vice 2001; Wiles, *et al.* 2003).

The USDA WS operates the BTS interdiction and control program at Andersen AFB and at the commercial airport on Guam. The purpose of the interdiction and control program is to impede the spread of the BTS to other islands from the Andersen AFB passenger terminal and along flight lines. The USDA WS concluded that a two-phase effort is required to effectively reduce the possibility of off-Base transport. The first phase establishes BTS traps and nightly spotlight searches around the perimeter of areas where cargo is loaded for transport. This has proved to be effective against snakes that immigrate into cargo areas, but does not protect against snakes stowed in outbound cargo. The second phase is a program that inspects all cargo prior to leaving the island. The USDA WS uses trained dogs (Jack Russell terriers) to search for and detect snakes in outbound cargo. There are currently 14 inspection teams (a team consists of one handler and one dog) (Vice, *et al.* 2004). A review of data for 1994-1996 reveals that the use of dogs to detect BTSs in cargo departing Andersen AFB has been effective in reducing the spread of the snake to vulnerable destinations (Engeman, *et al.* 1998).

Brown tree snake control is a priority for the DoD (Kreig 2005). The 36 WI 32-7004 ensures that 100 percent of outbound craft (air and water) from Andersen AFB is inspected (USAF 2006). The 36 WI 32-7004 is contained in Appendix C of Appendix E to this EIS.

3.5.2.2 Introduced Game Species

The black francolin (see Subchapter 3.5.2) is hunted throughout Guam, but is not hunted at Andersen AFB. Therefore, the black francolin is not considered a game species for this EIS, but is considered an introduced species.

Philippine Deer

Philippine deer were brought to Guam approximately 200 years ago from the Philippines, and rapidly spread throughout Guam. The Philippine deer is a regulated game species that typically live in forested areas and browse woody species and grasses. They appear to preferentially browse native woody species over non-native species. Population surveys of deer taken in 2000-2001 in MSA 1 revealed approximately 920 individuals, or 183 deer per square kilometer (Knutson and Vogt 2002), indicating some of the highest deer densities anywhere in the world. Further, these surveys suggest that individuals within the deer population are in generally good health, as determined by females breeding before 1 year of age (Shea, as cited in Knutson and Vogt 2002). Therefore, due to the general health of the population, the local carrying capacity has not yet been reached, and there are adequate resources to sustain deer on Guam.

A census of Philippine deer in the ASA project area was taken with spotlight surveys during January 2006 (Parsons 2006). The spotlight surveys suggest a maximum deer density to be 122 deer/square kilometer in the project area. Deer locations varied by vegetation community type.

Feral Pigs

Domestic pigs were brought to Guam by the Spanish in the late 1600s. Escaping to the wild, the pigs established feral breeding populations and now occur throughout Guam. Pigs, which

can eat almost anything, use their noses to root around in the forest floor searching for fallen fruits, young plants, coconuts, and animals such as worms and snails. They cause considerable damage by feeding on crops such as watermelon and taro. They also build and use wallows, which are pits that trap water when it rains. Like deer, pigs have adequate resources to support their population, and maintain very high densities. Population surveys of pigs taken in 2000-2001 in MSA 1 and Andersen AFB indicated a pig population of approximately 186 individuals, or 38 pigs per square kilometer (Knutson and Vogt 2002).

A census of feral pigs in the ASA project area was taken with spotlight surveys during January 2006 (Parsons 2006). Six pigs were observed during the spotlight surveys, which suggests a density of 21.4 pigs/square kilometer.

Public Hunting

To hunt either deer or pigs on Andersen AFB, a GovGuam Hunting License and Andersen AFB Hunting Permit are required to shoot or bow-hunt on designated segments of Northwest Field and Andersen main base. Land available for public hunting, sometimes on alternate days and others open every day, totals approximately 1,265 hectares (3,126 acres).

Gun and bow hunting are permitted on the Base; however, at most of the 3,126 acres where hunting is allowed within Northwest Field and Andersen main, it is restricted to bow hunting. Recreational hunting, especially when restricted to bow hunting, is having almost no effect on the population densities of either pigs or deer (Knutson and Vogt 2002). The current public hunting areas on Andersen AFB are shown in Figure 3.5-3. In addition to public hunting, depredation hunts for Philippine deer and feral pigs resulted in the removal of 400 deer and 100 pigs over a 5-month period in 2005 (Andersen AFB 2006).

3.5.3 Threatened and Endangered Species

3.5.3.1 Plant Species

Four plant species are considered in this EIS. Among these species, only three are thought to occur in the vicinity of the ASA and Commercial Gate project areas. Only occurrences of *Tabernaemontana rotensis* were recorded during January 2006 surveys.

Cyathea lunulata is an exceedingly rare Guam-listed endangered species. *Cyathea* generally grows along muddy drainage slopes in the hills of southern Guam (Moore and McMakin 2005). Little is known about the ecological relationships of *Cyathea* with pollinators, seed dispersers, or herbivores, and the possible reasons for its decline are unknown. *Cyathea* is not expected to occur within the ASA or Commercial Gate project areas.

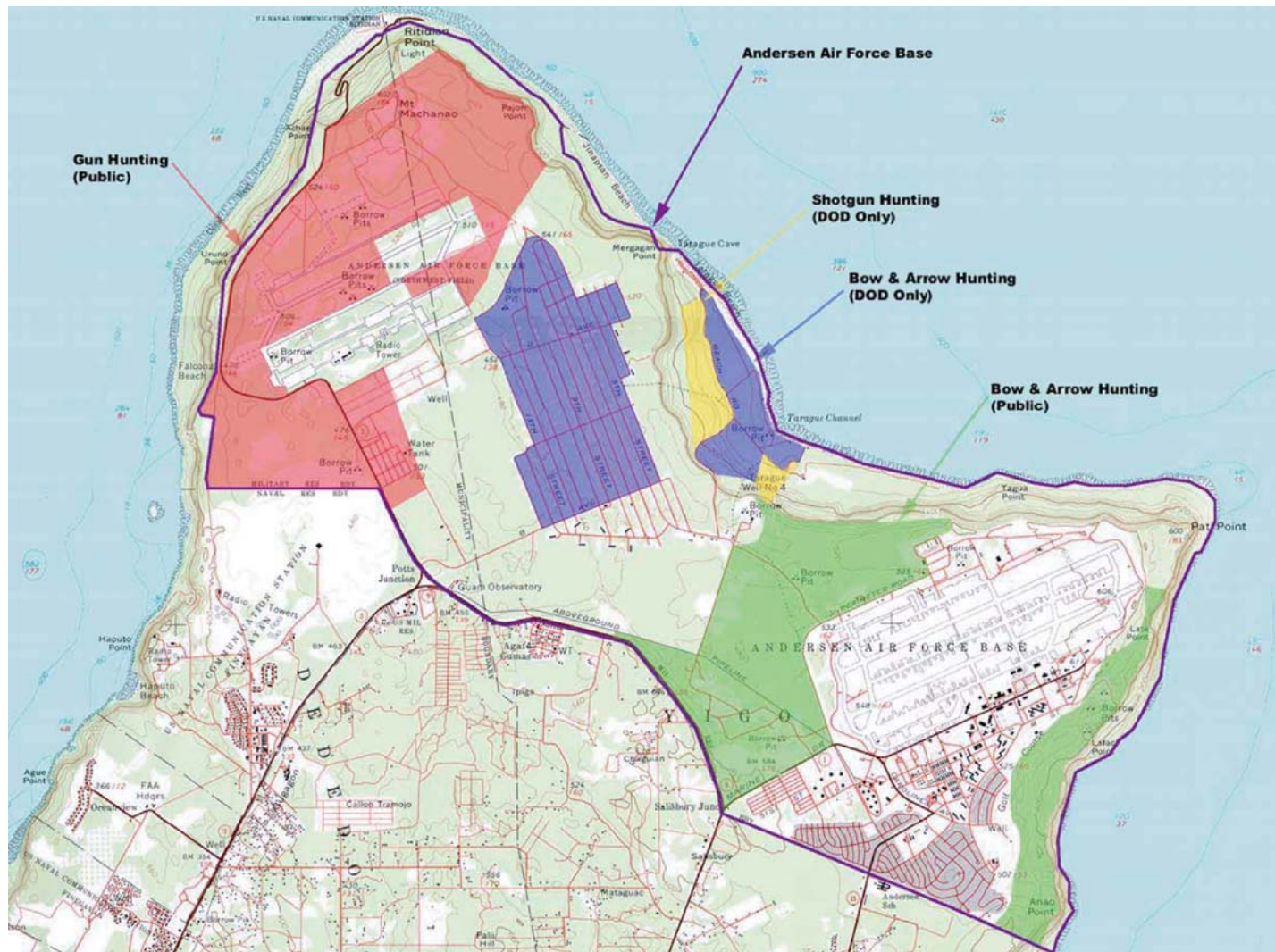


Figure 3.5-3

Public Hunting Areas

Andersen AFB, Guam

Source:
Integrated Natural Resources Management Plan, Andersen AFB, Guam - Department of
the Air Force 36th Air Base Wing Civil Engineer Squadron, December 2003.

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Heritiera longipetiolata grows in primary limestone forest, generally in crevices of rough limestone, often on cliffs (Raulerson and Rinehart 1991; Quinata 1994). However, little is known about the ecological relationships of *Heritiera* with pollinators, seed dispersers, or possible herbivores. The species, listed as endangered by GovGuam, is considered locally important and is considered in this EIS. This rare tree species is known to exist from the eastern portion of the limestone plateau in the vicinity of Lafac Point and a few individuals along the northern edge of Northwest Field (Quinata 1994). Quinata (1994) identifies several *Heritiera* individuals near Anao Point, which is on the southern edge of Andersen main. There were also a few, widely scattered *Heritiera* individuals identified adjacent to the cliff line east of Andersen main (Dicke 2006). There were no individuals identified in the ASA or Commercial Gate project areas (Parsons 2006).

Serianthes nelsonii was uncommon on Guam when first reported in the early 1900s (USFWS 1994), and was federally listed in 1987 without critical habitat (USFWS 1987). *Serianthes* is one of the largest trees in the native forest, growing to over 30 meters (98 feet) high with a crown diameter of over 20 meters (66 feet) (USFWS 1994). *S. nelsonii* grows along limestone cliffs, generally in primary forest. Fosberg (1960) reported that *S. nelsonii* also occurred in low numbers in late successional secondary forest. There are six known individual *S. nelsonii* trees on Guam. Two individuals are found in the Northwest Field vicinity, and the remaining four trees are found in Tarague Basin (Brooke 2006). One mature individual of this tree species on Guam is located between Northwest Field and Ritidian Point in the GNWR overlay. A second individual was located in the southeastern portion of Northwest Field. This second individual has been damaged by typhoons, and shows the effects of browsing and rubbing from deer, and previous fencing attempts have been rendered ineffective (Brooke 2005). No *S. nelsonii* trees are found within the ASA or Commercial Gate project areas. Habitat for *S. nelsonii* is highly degraded in forested areas of Andersen main, primarily due to ungulate pressure.

Tabernaemontana rotensis was thought to be endemic to Guam and the Island of Rota, morphologically distinct from congeneric species elsewhere in the western Pacific, and was formally proposed for endangered status under provisions of the ESA (USFWS 2004a). The monograph (published 1991) synonymizes *T. rotensis* and “several dozen previously recognized species” with a widespread and variable species, *Tabernaemontana pandacahui*. The known range of the *Tabernaemontana pandacahui* extends from southern China to Australia and east from Australia through the Philippines at least as far as the northern Marianas. Lacking any evidence of declining *T. pandacahui* populations, USFWS now finds no legal basis in the ESA provisions to list the taxon found on Guam and Rota (USFWS 2004e). Although the USFWS does not recognize *T. rotensis* as a separate species, it is considered locally important and is considered in this EIS. Clusters and individual mature trees and seedlings of *T. rotensis* have been recorded in portions of Andersen main and Northwest Field (USFWS 2000; Marler 2006; Parsons 2006). The *T. rotensis* individuals are typically located in primary or late successional secondary growth forests. They can be considered an “edge” species, and are often found in canopy gaps and occasionally along roadsides (USFWS 2000). The January 2006 surveys identified 15 locations of *T. rotensis* with a total of approximately 1,000 saplings within the ASA project area (Parsons 2006). No *T. rotensis* trees or saplings were recorded in the Commercial Gate project area.

3.5.3.2 Animal Species

Thirteen animal species (two mammals, seven birds), and four reptiles are federally protected on Guam. The GovGuam names 33 species as endangered or threatened status under the Guam Endangered Species Act, including 15 birds, three mammals, 10 reptiles, four mollusks, and one insect (Table 3.5-4). Many of the species appear on both lists. Table 3.5-4 lists the English common names, Chamorro common names, and scientific names of all T&E animals at Andersen AFB.

Table 3.5-4 English, Chamorro Common Names, and Scientific Names of Threatened and Endangered Animals at Andersen AFB

English Common Name ¹	Chamorro Common Name ¹	Scientific Name ²	Listing Status (F = Federal G = Guam)	Population decline or disappearance due primarily to BTS
BIRDS				
Nightingale Reed-Warbler	ga'karisu	<i>Acrocephalus luscini</i>	F = Endangered G = Endangered Extirpated from Guam	
Vanikoro Swiftlet (Island Swiftlet)	Yâgaguak	<i>Aerodramus vanikorensis bartschi</i>	F = Endangered G = Endangered	
Mariana Mallard	Ngânga'	<i>Anas platyrhynchos oustaleii</i>	F = none G = Endangered; Extinct	
Micronesian Starling	Sâli	<i>Aplonis opaca guami</i>	F = none G = Endangered	Yes
Mariana Crow	Âga	<i>Corvus kubaryi</i>	F = Endangered G = Endangered	Yes
White-throated Ground Dove	Paluman Apâka'	<i>Gallicolumba xanothura xanothura</i>	F = none G = Endangered; Likely extinct	Yes
Common Moorhen	Pulattat	<i>Gallinula chloropus guami</i>	F = Endangered G = Endangered	
Micronesian Kingfisher	sihek	<i>Halcyon cinnamomina cinnamomina</i>	F = Endangered G = Endangered Extirpated from Guam	Yes
Micronesian Megapode	Sasangat	<i>Megapodius laperouse</i>	F = none G = Endangered; Extinct	
Guam broadbill (Guam Flycatcher)	Chuguangguang	<i>Myiagra freycineti</i>	F = none G = Endangered; Extinct	Yes
Micronesian Honeyeater	Egigi	<i>Myzomela rubrata</i>	F = none G = Endangered Extinct on Guam	

Table 3.5-4 English, Chamorro Common Names, and Scientific Names of Threatened and Endangered Animals at Andersen AFB (*continued*)

English Common Name ¹	Chamorro Common Name ¹	Scientific Name ²	Listing Status (F = Federal G = Guam)	Population decline or disappearance due primarily to BTS
Mariana Fruit Dove	Totot	<i>Ptilinopus roseicapilla</i>	F = none G = Endangered; Extinct on Guam	Yes
Guam Rail	Ko'ko'	<i>Rallus owstoni</i>	F = Endangered G = Endangered Extirpated from Guam	Yes
Rufous Fantail	Chichirika	<i>Rhipidura rufifrons uraniae</i>	F = none G = Endangered; Extinct	Yes
Bridled White-eye	Nosa'	<i>Zosterops conspicillatus conspicillatus</i>	F = none G = Endangered; Extinct	Yes
MAMMALS				
Pacific Sheath-tailed Bat	Payesyes, or Fanihin Liyang	<i>Emballonura semicaudata</i>	F = none G = Endangered; Likely extinct	
Mariana Fruit Bat	Fanihi	<i>Pteropus mariannus mariannus</i>	F = Threatened G = Endangered	Yes
Little Mariana Fruit Bat		<i>Pteropus tokudae</i>	F = Endangered G = Endangered Likely extinct	
REPTILES				
Loggerhead sea turtle	Hagan Tasi	<i>Caretta caretta</i>	F = Threatened G = None	
Green Sea Turtle	Haggan Bed'di	<i>Chelonia mydas</i>	F = Threatened G = Threatened	
Snake-eyed skink	achi'ak	<i>Cryptoblepharus poecilopleurus</i>	F = None G = Endangered	
Leatherback Sea Turtle	Hagan Tasi	<i>Dermochelys coriacea</i>	F = Endangered G = None	
Tide-pool skink	achi'ak	<i>Emoia atrocasteta</i>	F = None G = Endangered	
Azure-tailed skink	achi'ak	<i>Emoia cyanura</i>	F = None G = Endangered	
Slevin's skink	achi'ak	<i>Emoia slevini</i>	F = None G = Endangered	

Table 3.5-4 English, Chamorro Common Names, and Scientific Names of Threatened and Endangered Animals at Andersen AFB (*continued*)

English Common Name ¹	Chamorro Common Name ¹	Scientific Name ²	Listing Status (F = Federal G = Guam)	Population decline or disappearance due primarily to BTS
Hawksbill Sea Turtle	haggan karai	Eretomochelys imbricata	F = Endangered G = Endangered	
Oceanic gecko		Gehyra oceanica	F = None G = Endangered	
Moth skink	achi'ak	Lipinia noctua	F = None G = Endangered	
Pacific Slender-toed skink	achi'ak	Nactus pelagicus	F = None G = Endangered	
Micronesian gecko		Perocinis ateles	F = None G = Endangered	
MOLLUSKS				
Mariana Islands Tree Snail	akaleha'	Partula gibba	F = Candidate G = Endangered Likely extinct	
Pacific Tree Snail	akaleha'	Partula radiolata	F = Candidate G = Threatened Likely extinct	
Mariana Islands Fragile Tree Snail	akaleha'	Samoana fragilis	F = Candidate G = Endangered Likely extinct	
INSECTS				
Mariana eight-spot butterfly		Hypolimnast octucula mariannensis	F = Candidate G = Endangered	

¹ English and Chamorro names taken from <http://www.guamdawr.org/>

² Species organized alphabetically by scientific name within each category

The four federally protected reptiles are all sea turtles and would not be present above the strand vegetation along the beach. There are seven species of lizards (skinks and geckos) listed as endangered by GovGuam. At one time, these species may have occurred in most habitats throughout Guam, but little is known about these lizards. Smaller BTSs on Guam readily prey on lizards (Rodda, *et al.* 1999), and the lizard populations have undergone rapid declines, primarily due to BTS predation (Rodda and Fritts 1992). Two species of birds, the Guam broadbill and the Mariana mallard, have not been recorded anywhere in nature in recent decades. These two species were removed by the USFWS from the federal ESA because they are thought to be extinct (USFWS 2004b), primarily due to BTS predation (see Table 3.5-4). There have been only incidental sightings of three bird species, the white-throated ground dove, the Island swiftlet, and the Mariana fruit dove (GovGuam 1999). There have been no recent sightings of three bird species, the bridled white-eye, Micronesian honeyeater, and rufous fantail, all of which are presumed either wholly extirpated from Guam or extinct everywhere throughout their historic range. There have been numerous sightings of the Micronesian starling in forested areas along the Base golf course and in family housing (Wald 2006). The Micronesian starling occurs in small numbers in several urban centers (Lujan 2005), but the population's size is presumed to be

very small. Two species of birds, the Guam rail and the Micronesian kingfisher, have been wholly extirpated in the wild, primarily due to BTS predation, and persist as captive lineages in zoos (USFWS 2004d). The remaining federally listed species, the Mariana crow, is the only bird species still found in the wild near Andersen main base, although in very limited numbers.

Two mammal species, the Pacific sheath-tailed bat and the little Mariana fruit bat, have not been sighted in several decades and are likely extirpated from Guam (Wiles, *et al.* 1995). The Mariana fruit bat is the only mammal that persists in the wild on Guam, and the numbers are steadily declining, partially due to BTS predation (Wiles, *et al.* 1995).

As shown in Table 3.5-4, there are a number of federally or locally listed animal species. However, many of those species and suitable habitat are not present within the ASA or Commercial Gate project areas. In addition to the plant species described above, the animal species listed in Table 3.5-5 are considered by the USFWS and by conservation officers at Andersen AFB to be the most critically important for this area at this time. The animal species listed in Table 3.5-5 are considered in detail below.

Table 3.5-5 Animal Species of Concern

	Scientific Name	Common Name	Federal Listing	Guam Listing
Mammal	<i>Pteropus mariannus mariannus</i>	Mariana fruit bat	Threatened	Endangered
Birds	<i>Corvus kubaryi</i>	Mariana crow	Endangered	Endangered
	<i>Halcyon cinnamomina cinnamomina</i>	Micronesian kingfisher	Endangered	Endangered
	<i>Rallus owstoni</i>	Guam rail	Endangered	Endangered
Mollusks	<i>Partula radiolata</i>	Pacific tree snail	Candidate for Listing	Threatened
	<i>Partula gibba</i>	Mariana Islands tree snail	Candidate for Listing	Endangered
	<i>Samoana fragilis</i>	Mariana Islands fragile tree snail	Candidate for Listing	Endangered
Insect	<i>Hypolimnus octicula var. mariannensis</i>	Mariana eight-spot butterfly	Candidate for Listing	Endangered

Mariana Fruit Bat

The Mariana fruit bat was listed as endangered in 1984 (USFWS 1984). By 1995, the Guam population of the Mariana fruit bat was between 300 and 500 individuals (USFWS 2004c). This nocturnal mammal forages across Andersen AFB, Northwest Field, and MSA 1 (USFWS 2004c; 2005a). The last known roosting colony is located on Andersen AFB near the Pati Point Natural Area. In the past, populations of the Mariana fruit bat on Guam and the Northern Mariana Islands were considered to be separate, and the Guam population was listed as endangered. A change in the status of the Mariana fruit bat on Guam from endangered to threatened reflects the recent classification of the populations on several islands (particularly, Guam and Rota) as a single population, not as an increase in reproductive success on Guam (USFWS 2005a). The bats prefer to roost in large *Ficus prolixia*, *Neisosperma*, and *Mammea odorata* trees during the day (Wiles 1986). The bats prefer to forage for fruit in *Artocarpus mariannensis*, *Artocarpus altilis*, *Pandanus dubious*, *Cycas*, *Mammea*, *Ficus prolixia*, *Elaeocarpus*, *Ficus tinctoria*,

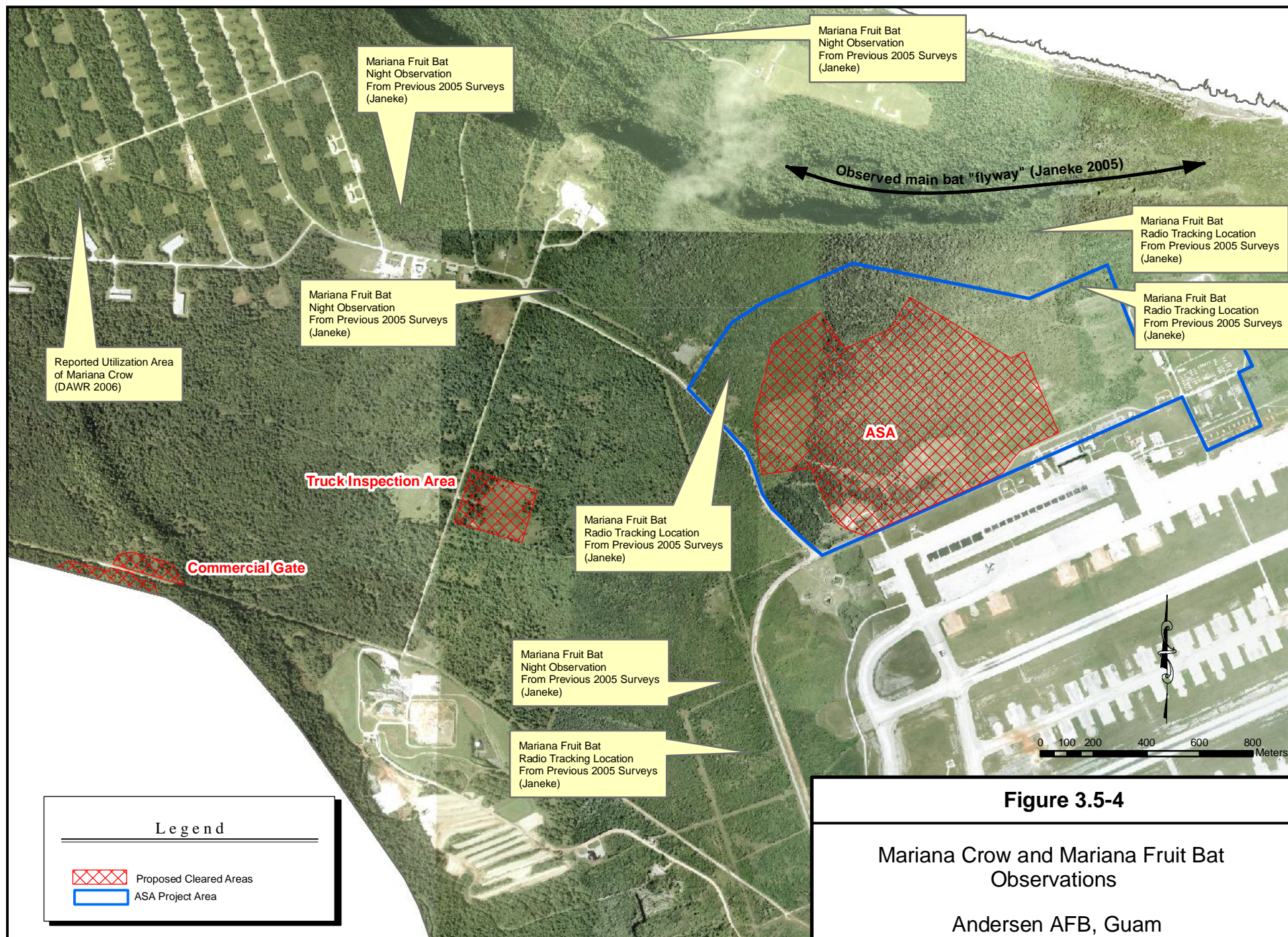
Erythrina variegata, and *Pandanus tectorius* (Wiles 1986; Andersen AFB 2003c). Guam currently has fewer than 30 fruit bats (Brooke 2006; Dicke 2006) in the roosting area near Pati Point. The numbers are declining steadily, probably due, in part, to BTS predation on non-volant juveniles (*i.e.*, too old to be carried by an adult, and too young to fly) (Wiles, *et al.* 1995) and low frequency but chronic poaching (Brooke 2005; Wiles 1994). No Mariana fruit bat juveniles are thought to currently inhabit the colony at Pati Point, suggesting an alarmingly high rate of BTS predation (Dicke 2006).

A bat survey was conducted in January 2006 (Parsons 2006) to determine if Mariana fruit bats were present within the ASA and Commercial Gate project areas, but none were observed. However, six observations were recorded by survey personnel in adjacent areas within 800 meters (2,625 feet) of the ASA project area, and were provided by USFWS personnel (Brooke 2005). One female fruit bat was tracked with radio telemetry foraging in an intact forested area approaching the cliffline within the ASA project area. Figure 3.5-4 shows the locations of Mariana fruit bat observations relative to the project areas.

Although highly degraded from ungulate pressure, prior land use, and presence of the BTS, useable habitat for the Mariana fruit bat is present within the ASA and Commercial Gate project area (Wiles, *et al.* 1995). This potential habitat occupies 57.5 hectares (142.1 acres), primarily within the forest community types that contain suitable associative tree species, especially in areas overlying rocky and karst substrates that have been spared from past land clearing activities. Of the 57.5 hectares (142.1 acres) identified as potential habitat for the Mariana fruit bat, 1.4 hectares (3.5 acres) can be considered higher quality based on the canopy structure for roosting and species composition for foraging. With the main colony of Mariana fruit bats at Pati Point, it is probable that Mariana fruit bats would forage in suitable tree species found within the ASA project area.

Mariana Crow

The Mariana crow was listed as endangered in 1984 (USFWS 1984), and only a few remaining Mariana crows occur on the northern end of Guam and the Island of Rota. Many of the less than 15 birds remaining on Guam were transplanted from Rota, and all are reported to be at or near Andersen AFB (USFWS 2004b; GovGuam DAWR 2005). The Mariana crow seems to have a preference for native trees of large stature, nesting most frequently in emergent *F. prolixa* and *E. yoga* trees (Morton 1996; Lujan 1996), although there is some evidence the crow will nest in late successional secondary growth forest, including *Guamia mariannae* (paipai) and *Premna obtusifolia* (ahgao) (Andersen AFB 2003c). The crows are omnivorous, and will forage in a number of trees, including *Artocarpus mariannensis*, *C. nucifera*, *F. prolixa*, *P. dubious*, *C. equisetifolia*, and *N. oppositifolia* (Tomback 1986; USFWS 1990a; USFWS 2005b). The crows are sensitive to human disturbance, and prefer to nest in trees greater than 290 meters (951 feet) from roadways (Morton 1996; USFWS 2004b), although there has been evidence of nesting attempts approximately 10 meters (33 feet) from a road and another nest approximately 30 meters (98 feet) from a road (Lujan 2005).



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In addition, crows have reportedly nested at MSA 1, where blocks of forest are approximately 110 meters (361 feet) wide (Lujan 2005). Population declines of the Mariana crow are primarily the result of habitat loss and predation by the BTS (Savidge 1987; Wiles, *et al.* 2003; GovGuam DAWR 2005). Andersen AFB contains tracts of native limestone forest, some of which could be considered relatively intact (*e.g.*, the forested areas proposed for critical habitat, including Northwest Field, MSA 1, and Andersen main). The higher quality tracts are considered essential to recovery of the Mariana crow, while tracts at lower states of succession have potential for habitat restoration efforts (USFWS 2004c).

A crow survey was conducted within the ASA and Commercial Gate project areas in January 2006 to determine the presence of Mariana crows (Parsons 2006). No crows were observed. Ten juvenile crows were released by DAWR in November in MSA 1 (Dicke 2006). A crow was reported by a hunter on November 27, 2005 within Andersen main, south of Northwest Field (Brooke 2005). Figure 3.5-4 shows locations of Mariana crow observations relative to the ASA and Commercial Gate project areas. Recent data obtained from DAWR (Dicke 2006) indicate nesting and utilization areas occur mostly within MSA 1, in eastern portions of Northwest Field, and at Pati Point.

Although highly degraded from ungulate pressure, prior land use, and presence of the BTS, habitat for the Mariana crow is present within the ASA and Commercial Gate project areas (Lujan 1996; Savidge 1987; Wiles, *et al.* 1995; Lujan 2005). This potential habitat occupies 57.5 hectares (142.1 acres), primarily within the forest community types that contain suitable associative tree species, especially in areas overlying rocky and karst substrates that have been spared from past land clearing activities. Of the 57.5 hectares (142.1 acres) of potential habitat, 1.4 hectares (3.5 acres) can be considered more suited to the Mariana crow due to species composition and structure. Lujan (1996) recorded crow nests in *F. prolixa* trees in the general area of the ASA project.

Micronesian Kingfisher

The Micronesian kingfisher was listed as endangered in 1984 (USFWS 1984). It has been wholly extirpated in the wild due to habitat loss and predation by the BTS (Savidge 1987; Wiles, *et al.* 2003), and persists in zoos in captive lineages (GovGuam DAWR 2005) and at a captive breeding facility on Guam operated by DAWR. The Micronesian kingfisher nests and feeds primarily in mature limestone forests and late successional secondary growth forests, and occasionally in *Cocos nucifera* plantations. The Micronesian kingfisher feeds entirely on animal matter, and is a deliberate forager (USFWS 1990a). Its general foraging habit is to perch motionless on large trees with exposed branches and survey the ground below. Nesting behavior includes excavation of nesting cavities from large trees with “soft” or partially “rotten” wood, typical of native limestone forest. Its preferred nesting tree is the *Pisonia grandis* (GovGuam DAWR 2005), but they will also utilize *Artocarpus mariannensis*, *Cocos*, and *Ficus prolixa* if available (USFWS 1990a).

Survey data from 1981 indicate that Micronesian kingfishers were present in the northern portion of Andersen AFB. Proposed construction would remove 57.5 hectares (142.1 acres) of secondary growth forest and shrubby areas that are potential foraging and nesting habitat for the Micronesian kingfisher.

Guam Rail

The Guam rail is a flightless, omnivorous, ground-nesting bird. Although omnivorous, the Guam rail prefers animal matter over vegetable matter (*e.g.*, lizards, gastropods, and carrion). The Guam rail generally lives in brushy areas mixed with grassland or forest (USFWS 1990a), and was listed in 1984 as endangered in its entire range (USFWS 1984). It has been wholly extirpated in the wild due to predation from the BTS, and persists as captive lineages in zoos (GovGuam DAWR 2005; Wiles *et al.* 1995) and at a captive breeding facility on Guam operated by DAWR. BTSs are not present on the Island of Rota, and habitat was designated for release of Guam rails. The introduced population of Guam rails on Rota was considered an experimental, non-essential population (USFWS 1989), and was proposed to be used for future “wild” introductions to Guam. On Guam, Area 50 was fenced to exclude BTSs, and extensive trapping of BTSs has occurred. In 1988, 16 Guam rails were released into Area 50; at least four of the birds died, but four breeding pairs hatched 10 chicks. In 2000, the Guam DAWR initiated playback surveys which detected 10 Guam rails within Area 50 (GovGuam DAWR 2000a). Although fencing is preventing predation by BTSs, feral cats and rats are still able to enter the area and prey on eggs, juveniles, and adult rails (GovGuam DAWR 1999). Conservation personnel indicate that no rails are currently present in Area 50 (Lujan 2005). Construction in the ASA and Commercial Gate project areas would remove 34.2 hectares (84.5 acres) of suitable habitat.

Mollusks

None of the four partulid tree snails is listed as endangered, even though one (Mt. Alifan tree snail) recently became extinct (Wiles, *et al.* 1995). The remaining three species of tree snails occur only in very restricted environments in northern Guam. None of these three species has been observed in recent years within Andersen main or other portions of Andersen AFB (USAF 2000; Andersen AFB 2003c). Vegetation commonly associated with the tree snails include kahu, screw pine, Paipai (*Guamia mariannae*), hibiscus tree, False rattan (*Flagellaria indica*), and Wild passion flower (*Passiflora suberosa*). The snails prefer moist closed canopy forested areas, with minimal ground level disturbance. The primary reasons for decline of the three snail species are due largely to habitat alteration (exacerbated by deer and pigs), and predation by the invasive Giant African snail (*Achatina fulica*) and the invasive Black flatworm (*Platydemus manokwari*) (Hopper and Smith 1992).

None of the three candidate snails were observed within the ASA or Commercial Gate project areas during January 2006 surveys. Presence of the African tree snail, a known predator of the candidate snails, was observed in the project areas.

Habitat for the three candidate snails exists in mesic, relatively closed-canopy forest, where ground disturbance has been minimal or absent (Hopper and Smith 1992). Most potential snail habitat at Andersen main has been degraded as a result of prior land use and disturbance. Marginal habitat, however, appears to be present in a narrow band of intact secondary limestone forest near the cliff line in the northern portion of the ASA project area, as well as in a pocket of intact secondary forest on a karst substrate in the southwest portion of the ASA. This habitat occupies 6.5 hectares (16.1 acres) of the ASA project area. No habitat is present within the Commercial Gate project area.

Insects

The Mariana eight-spot butterfly (*Hyploymnus octicula mariannensis*) is a federal candidate for T&E listing (USFWS 2002). The larvae of this species feed on two native plants, *Procris pedunculata*, and *Elatostema calcareum*. These forest fleshy herbs only grow on karst limestone, and the plant species have declined due to browse pressure by the Philippine deer. In addition, decline of the species is due to very high mortality of the eggs and larvae of the butterfly due to predation by non-native wasps and ants (USFWS 2002).

No observations of the Mariana eight-spot butterfly occurred during surveys within the ASA or Commercial Gate project area. In addition, the associative plants *Procris pedunculata* and *Elatostema calcareum*, were not observed during surveys. One butterfly species *Euploea eunice hobsonii* (no known common name) was fairly common in the open herbaceous community type. Other butterfly species were observed, including the Common swallowtail (*Papilio xuthus*) and the Monarch (*Danaus archippus*).

Recent observations were reported of the Mariana eight-spot butterfly, along with *P. pedunculata* and *E. calcareum* along a rocky pinnacle karst area toward Pati Point, approximately 800 meters (2,625 feet) from the ASA project area (Lawrence 2005). A pair of Mariana eight-spot butterflies were observed, apparently defending an area from an individual *E. Eunice hobsonii*.

Critical Habitat Designation and Guam National Wildlife Refuge

The GNWR was established in 1993 to protect and recover T&E species, protect habitat, control non-native species (with emphasis on the BTS), protect cultural resources, and provide public recreational and educational opportunities. The GNWR contains eight management units. The Ritidian Unit is a 312-hectare tract composed of coral reef and terrestrial habitat wholly owned by the USFWS. The remaining seven management units contain 9,088 hectares (22,457 acres) on Air Force and Navy land, and are classified as overlay refuge units. USFWS has consulting rights and management obligations on overlay refuge land. Approximately 4,168 hectares (10,299 acres) of Andersen AFB is classified as overlay refuge land. Figure 3.5-5 shows the location of the GNWR management units on Guam, and the Overlay Refuge on Andersen AFB.

In 2004, USFWS designated 150 hectares (371 acres) of terrestrial habitat within the Ritidian Unit of the GNWR as critical habitat for the Mariana fruit bat, Mariana crow, and the Micronesian kingfisher (USFWS 2004c). Critical habitat designations are pursuant to 4(b)(B)(2) of the ESA. Before the USFWS designation of critical habitat in 2004, the 4,168-hectare portion of the GNWR overlay on Andersen AFB was proposed to be designated as critical habitat. The portion of the Andersen AFB is considered critical for recovery of the listed species, but the INRMP for Andersen AFB (Andersen AFB 2003c) exempted the GNWR overlay from the USFWS critical habitat designation. The INRMP provides provisions for USFWS to proactively manage the GNWR overlay and assist Andersen AFB with natural resource coordination at an early stage of project planning (Andersen AFB 2003c).

3.5.4 Natural Resources Planning

The Air Force prepared an INRMP for Andersen AFB (Andersen AFB 2003c) in accordance with the Sikes Act, as amended through 2003 (Title 16, USC 670a, *et seq.*), AFI 32-7064, and

DoD directive 4700.4. The INRMP provides a framework for the conservation and management of natural resources in conjunction with the military mission at Andersen AFB. Further, the INRMP provides guidelines for management in the following program areas: T&E and species of special status under federal or local statutes; fish and wildlife conservation; grounds maintenance; outdoor recreation; coastal resources; cultural resources; and water resources. The INRMP also defines a management program to ensure compliance with regulatory requirements. In accordance with the Sikes Act improvement amendments, the USFWS is a signatory agency on the Andersen AFB INRMP.

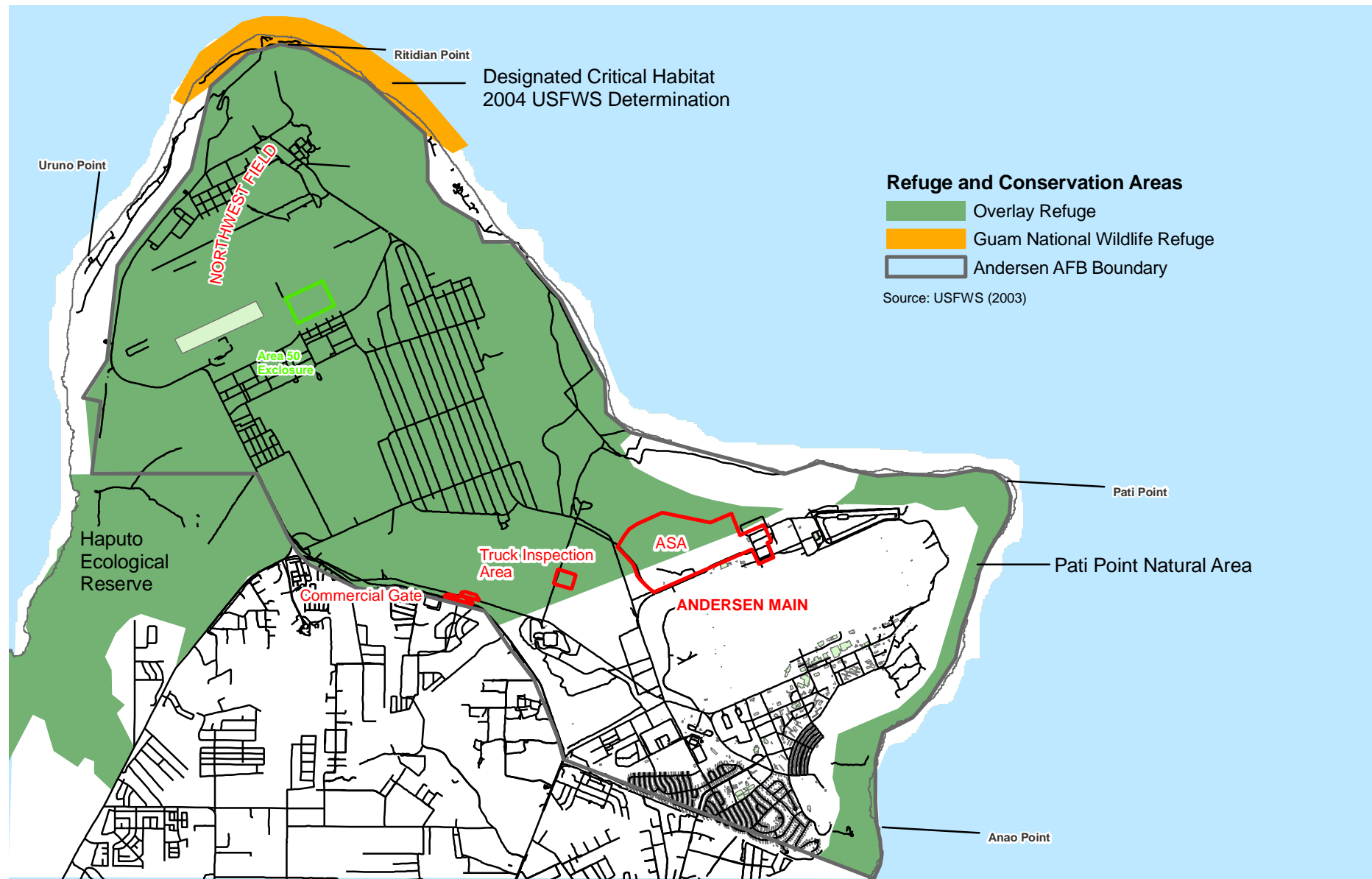
The INRMP is designed to be a tool to guide short-term resource management activities (0-2 years) and mid-range planning for resource conservation and mission needs (3-5 years). Therefore, Alternative A would need to consider the guidelines for natural resource management provided in the INRMP. The management goals described in the INRMP include utilization and management of Andersen AFB's natural resources consistent with its military mission; protection and recovery of sustainable populations of the USFWS endangered plant and animal species present on Andersen AFB; and study, evaluation, and protection of other locally threatened plant and animal species on Andersen AFB. The Andersen AFB INRMP supports the Guam National Wildlife Refuge (Refuge Overlay) in partnership with USFWS in accordance with the Cooperative Agreement of March 1994 (Andersen AFB 2003c).

3.6 GROUNDWATER RESOURCES

The Northern Guam Lens aquifer supplies up to 80 percent of the island's potable water and serves as the primary source of potable water for the island. Other potable water sources are from surface water on the island. The aquifer is replenished from precipitation that percolates through the limestone. Groundwater is typically found approximately 450 to 500 feet below ground surface (bgs) (Andersen AFB 2000). The Northern Guam Lens is being considered by the Guam EPA as "groundwater under direct influence of surface water." The aquifer has also been designated by USEPA as a Sole Source Aquifer under the Safe Drinking Water Act.

The high permeability of the limestone in northern Guam allows rapid infiltration of rainfall so surface runoff occurs locally only after intense rain. The limestone also offers little resistance to ground-water flow so only a thin freshwater lens has developed. Water levels in the freshwater lens vary several feet daily and seasonally in response to ocean tides, recharge, and ground-water withdrawal. The thickness of the freshwater lens varies seasonally, primarily in response to seasonal variations in recharge (USGS 2003). Depending on particle size, filtration occurs as surface water percolates through the soil and underlying limestone unless there is a direct conduit to the aquifer such as a UIC well or a continuous fracture. Base personnel monitor all construction activity and requires an EPP that identifies actions necessary to reduce or preclude surface contamination from entering the UIC wells.

Groundwater serves as the primary source of drinking water to Guam and other nearby islands. Groundwater is stored in highly-permeable limestone aquifers which were originally formed as coral reefs. In some areas, these limestone aquifers have been uplifted by the underlying volcanic rocks, or "high-level limestone aquifers" (Guam EPA 2006).



1

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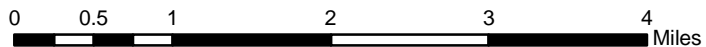


Figure 3.5-5

Guam National Wildlife Refuge Overlay

Andersen AFB, Guam

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The only source of groundwater is precipitation, which infiltrates to the subsurface and recharges the underlying water table (the upper surface of the groundwater system). Guam receives approximately 90-100 inches of rain per year. A significant portion of this is lost to evapotranspiration; some is lost to surface runoff, and the remaining portion is available as “recharge” to groundwater. This recharge is the only source of replenishment to the groundwater system. The average annual recharge rate is estimated at 35 inches per year. The thickness of the groundwater lens is directly related to the recharge rate and to water withdrawal rates (Guam EPA 2006).

Andersen AFB lies on the northern portion of three groundwater subbasins: the Finegayan subbasin under the western third of the Base; the Agafa Gumas subbasin under the central portion of the Base, which includes Northwest Field; and the Andersen subbasin under the eastern portion of the Base (Andersen AFB 2000). Over 100 dry wells were created at the Base to assist in storm water recharge into the aquifer. However, this method has the potential to cause groundwater contamination from storm water runoff (Andersen AFB 2004b). Past activities have not resulted in extensive groundwater contamination due to use of the procedures in the Base’s SWPPP (Andersen AFB 2000). Groundwater in each subbasin consists of a basal or parabasal zone. Subsurface freshwater floats above the seawater within the basal zone, while in the parabasal zone, freshwater flows directly on the impermeable volcanic basement rock (Andersen AFB 2000).

In 1993, the Agency for Toxic Substances and Disease Registry (ATSDR) conducted an initial site visit on Guam to collect data and evaluate public health concerns associated with five potential exposure pathways at Andersen AFB, as well as other community concerns. The ATSDR conducted follow-up visits in January 1999 and May 2000. A public health assessment for Andersen AFB was prepared in January 2002 (ATSDR 2002).

Parts of Andersen AFB overlie the Groundwater Protection Zone, an area which supplies most of the island's population with drinking water. During IRP investigations, groundwater underlying Andersen AFB was found to be contaminated with VOCs. VOCs at levels above the ATSDR’s health-based comparison values and USEPA Safe Drinking Water Standards were also found in three base production wells. These VOCs included trichloroethylene and tetrachloroethylene. Other active drinking water base production wells are either upgradient of or some distance away from areas of contamination. ATSDR evaluated past exposure to contaminants in the affected production wells and determined that drinking this water would not harm individuals or increase their likelihood of developing adverse health effects.

ATSDR also concluded the agency does not expect any public health hazards, now or in the future, for individuals drinking water from the Andersen AFB water supply or any other production wells on Guam. Several reasons for this include: 1) the military’s remediation actions are further reducing contamination at the Base; and 2) the natural groundwater flow patterns dilute chemical contaminants to concentrations well below levels of public health concern. Finally, mixing of drinking water in the Base’s distribution system further dilutes the levels of any contaminants in the water before the water reaches the taps.

On the basis of its evaluation of available environmental information, ATSDR concluded that exposures to contaminants in groundwater, surface soil, and local plants and animals harvested for consumption are below levels that would cause adverse health effects. ATSDR has

categorized the Base as “no apparent public health hazard” because of the Air Force's education efforts, access restrictions and monitoring programs at Andersen AFB, contact with unexploded ordnance (UXO) and the possibility of harm is remote.

Approximately 43 mgd of water is withdrawn from the Northern Guam Lens aquifer (GWA 2006). The 2.5 mgd of water Andersen AFB withdraws from the aquifer equates to about 5.81 percent of the daily water withdrawal.

3.7 EARTH RESOURCES

3.7.1 Geology and Topography

Guam is located at the eastern edge of the Philippine Plate at the subduction boundary of the Pacific Plate. The deepest submarine trench in the world, the Marianas Trench, is located approximately 6 miles below the ocean surface in the subduction boundary east of Guam. Due to movement of lithospheric plates, Guam is prone to earthquakes. Between 1849 and 1911, four earthquakes with a magnitude of 7.0 or greater on the Richter Scale occurred in the vicinity of Guam. The most recent large-magnitude earthquake was recorded August 1993 and measured 8.1 on the Richter scale (Andersen AFB 2004b).

Guam is divided into four geophysical regions: (1) the volcanic remnants of south Guam; (2) the deformed beds of the Alutom formation of central Guam, composed of well-defined, fine to coarse-grained gray, green, and brown tuffaceous shale and sandstone; (3) the limestone formations of the northern plateau; and (4) coastal lowlands (Andersen AFB 2004b).

Andersen AFB lies on the limestone formations of the northern plateau. A narrow coastal lowland terrace is located at the bottom of steep cliffs that surround the plateau on the north, east, and west. This coastal zone is between 300 to 900 feet wide from the base of the cliff to the shore. Massive limestone formations from the Miocene-age (approximately 23.3 to 6.7 million years old) to the Pleistocene-age (about 5.2 to 3.4 million years old) underlie the Base. These formations were exposed by tectonic uplift and sea level fluctuations. The underlying limestone subtypes range from brittle to well-cemented (Andersen AFB 2004b).

The northern area of Guam is karst terrain that exhibits solution cavities and caves within the porous limestone bedrock. Collapses of these subterranean cavities form sinkholes, which are prominent topographic features of the limestone. The area is dominated by subsurface drainage instead of well-integrated surface drainage systems with principal stream valleys and tributaries. Rainwater easily percolates through the limestone to recharge the Northern Guam Lens aquifer, which is Guam's only drinking water aquifer (Andersen AFB 2000).

3.7.2 Soil

Five major soil types are found in Guam, including laterite (volcanic), riverine mud, coral rock, coral sand, and argillaceous (mixtures of coral and laterite soil). Guam soil is classified into three categories: bottomland; volcanic upland, and limestone upland. Soil at Andersen AFB is classified as limestone upland. This soil exhibits moderately rapid permeability and low water capacity. A thin layer (between 4 to 10 inches) of Guam cobbly clay soil overlies the northern limestone substrate, contributing to a shallow vegetation root structure at the Base (Andersen AFB 2004b).

Radon, a radioactive gas that seeps out of rocks and soil, comes from uranium that has been in the ground since the time the earth was formed. The rate of seepage is variable, partly because the amounts of uranium in the soil vary considerably (USEPA 1998a). Radon can occur in high concentrations in soil and rocks containing uranium, granite, shale, phosphate, and pitchblende. Radon may occur also in soil contaminated with industrial waste byproducts from uranium or phosphate mining (USEPA 1992). Subchapter 3.3.4 summarizes the results of radon testing at Andersen AFB.

3.8 HAZARDOUS MATERIALS AND WASTE

The 36 CES/CEV is responsible for management of hazardous materials and waste for the entire Base. A Hazardous Materials Pharmacy was instituted at Andersen AFB to oversee and minimize the procurement, use, and disposal of hazardous materials. Disposal of hazardous waste is arranged through a Defense Reutilization Marketing Office (DRMO) service contract where licensed hazardous waste contractors remove and dispose of the waste, and DRMO maintains all hazardous waste documentation in accordance with pertinent regulations. Andersen AFB has developed specific plans to manage both hazardous materials and hazardous waste at the Base.

3.8.1 Hazardous Materials

Management of hazardous materials at Air Force installations is established primarily by AFI 32-7086, *Hazardous Materials Management*. The AFI incorporates the requirements of federal regulations, other AFIs, and DoD directives, for reduction of hazardous material uses and purchases. Andersen AFB developed a Hazardous Materials Management Plan pursuant to the AFI for all Air Force personnel who authorize, procure, use or dispose of hazardous materials and to those who manage, monitor, or track any of those activities.

Hazardous materials are managed by the Base's Hazardous Materials Pharmacy. The pharmacy was established to oversee, procure, dispose, and minimize the use of hazardous materials. Use of a hazardous materials pharmacy program reduces the need to store large quantities of hazardous materials on Base and allows those materials to be ordered on an as-needed basis.

3.8.2 Hazardous Waste

Pursuant to AFI 32-7042, *Hazardous Waste Management*, the Base developed a *Hazardous Waste Management Plan* as guidance for personnel on the proper handling, storage, and disposal of hazardous waste, and implements the USEPA's "cradle-to-grave" management controls for hazardous waste.

The Base has 13 satellite accumulation points and one 90-day accumulation point. Disposal of hazardous waste is managed through the DRMO. The DRMO maintains all hazardous waste documentation and contracts with off-island licensed contractors for proper disposal of waste (Andersen AFB 2003b).

The primary types of hazardous waste generated at Andersen AFB include medical supplies, adhesives, paint-related waste, solvents, batteries, contaminated absorbents from spill cleanup, oil filters, and corrosive liquids. The existing Army and Air Force Exchange Service store outlet

and cashier kiosk does not routinely generate hazardous waste; however, it stocks a variety of consumer items (*e.g.*, aerosol cans containing paints or pesticides, auto care products, house cleaning products, solvents) that are or may contain hazardous substances. Such products, if spilled or otherwise unintentionally released, could be categorized as hazardous waste. Additionally, containers of hazardous materials that remain in storage beyond their intended shelf life, or that become damaged cannot be sold, must be managed and disposed as hazardous waste (Andersen AFB 2003b).

3.8.3 Installation Restoration Program

The Air Force established the Installation Restoration Program (IRP) in 1983 to identify, characterize, and evaluate past (pre January 1984) disposal sites and remediate contamination on its installations as needed to control migration of contaminants and potential hazards to ecological resources, human health, and the environment in accordance with Comprehensive Environmental Response, Compensation, and Liability Act requirements. IRP goals are to protect human health and the environment by cleaning up and restoring Air Force sites where past activities created contamination from toxic and hazardous substances, low-level radioactive materials, and petroleum, oil, and lubricants. Current IRP efforts are aimed at characterizing all active sites, determining future remedial actions, and implementing interim removal or remediation actions to reduce risks and eliminate contamination sources. Air Force policy covers all sites where contamination occurred prior to January 1984. Sites where all contamination occurred after January 1984 are remediated under the Compliance Cleanup program.

In 1983, Andersen AFB began an investigation to identify and correct environmental contamination from past hazardous waste activities. Early stages of this investigation show that waste from past day-to-day operations and activities may have contaminated areas at the Base. Andersen AFB was placed in the National Priorities List on October 14, 1992 and entered into a Federal Facility Agreement with the USEPA and the Territory of Guam for installation environmental restoration efforts on March 30, 1993. According to the Base IRP Management Plan, 78 IRP sites and 74 solid waste management units (SWMU) have been identified Base-wide. In June 2003 three areas of concern (AOC) in MARBO Annex (which is not on Andersen main and is not in the ISR/Strike project area) were converted to IRP sites (Andersen AFB 2003b). In January 2005, all remaining AOCs (32 sites) were converted to IRP sites by PACAF directive. Two SWMU sites were deemed eligible for IRP status and were transferred in June 2006 increasing the total number of IRP site from 43 to 78. Appendix C, Installation Restoration Program Data, contains a description or nature of the contamination and the current status of each site, as well as a figure depicting the location of each site.

3.8.4 Stored Fuel

Andersen AFB accomplishes numerous fueling operations to support aircraft and vehicle operation. The majority of fuel handled at Andersen AFB is aviation jet fuel. Other activities include receiving, storage and dispensing of petroleum, oils, or lubricants, including on-Base consumption of diesel fuel and gasoline by motor vehicles, consumption of containerized lubricants and other petroleum products, and consumption of diesel fuel for emergency power generation. Fuel storage facilities at the Base have the primary and secondary containment features required by regulatory guidance to contain unintended spills and leaks from becoming

an environmental issue. Andersen AFB has management plans for fuels management, spill containment, and cleanup of petroleum, oils, and lubricants.

Bulk jet fuel is sent to Andersen AFB from fuel facilities at Apra Harbor via pipeline. Diesel and gasoline are delivered to the Base by truck. Andersen AFB has the capacity to store 66,000,000 gallons of jet fuel at the Base. Approximately 2,200,000 gallons of jet fuel were dispensed to aircraft in 2004 (Andersen AFB 2005c), which equates to about 6,027 gallons per day and about 0.01 percent of the storage capacity.

3.9 CULTURAL RESOURCES

Cultural resources include prehistoric and historic archaeological sites, buildings, structures, districts, artifacts, objects, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, or religious purposes. Historic resources, under 36 CFR 800, are defined as “Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the National Register of Historic Places.” The term “eligible for inclusion in the National Register” includes both listed and eligible properties that meet NRHP listing criteria found in 36 CFR 60.

In accordance with 36 CFR 800.16(d), the area of potential effects is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic resources, if any such properties exist. The area of potential effect is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking. In many instances, the APE is not simply the project’s physical boundaries, or right-of-way. Section 110 of the National Historic Preservation Act requires that each federal agency establish a cultural resources management program to identify, evaluate, and nominate resources to the NRHP and protect historic resources.

The Air Force prepared an Integrated Cultural Resources Management Plan (ICRMP) for Andersen AFB in accordance with AFI 32-7065 and DoD Instruction 4715.3 (Andersen AFB 2003a). The ICRMP identifies program responsibilities and management framework; defines compliance procedures related to installation mission and cultural resources; and provides an inventory of cultural resources on Andersen AFB. The ICRMP also identifies historic resources, land uses on the Base, and impacts to cultural resources; further, the ICRMP defines a management program to ensure compliance with regulatory requirements.

The Air Force has established a general division of Andersen AFB into nine, distinct Cultural Resource Management Areas (CRMA) based on survey coverage and current land use as defined in the General Plan. The APE for Alternative A on Andersen AFB overlays three of the nine CRMAs described on Table 3.9-1 and shown on Figure 3.9-1.

Table 3.9-1 CRMAs Underlying the Proposed Alternative A Project Sites

CRMA	Description (Land Use and Locale)
II	Mixed Land Use, area around Main Operations Area
III	Mixed Land Use, Main Operations Area
IV	Open Space; central area of Andersen AFB

Source: International Archaeological Research Institute, Inc. [IIARI] 2004

3.9.1 Historic Resources

The first human habitation of Guam is believed to date from about 1,000 B.C. during the arrival of the Chamorro people, a Malayo-Polynesian group from Southeast Asia. Descendants of these first settlers then lived in relative isolation in the western Pacific for 2,500 years, until the arrival of a small Spanish fleet led by Ferdinand Magellan in 1521. After being a Spanish colonial possession during the 16th century, Guam was ceded to the United States after the Spanish-American War in 1898. The island was captured in 1941 by Japanese forces and recaptured by the United States in 1944.

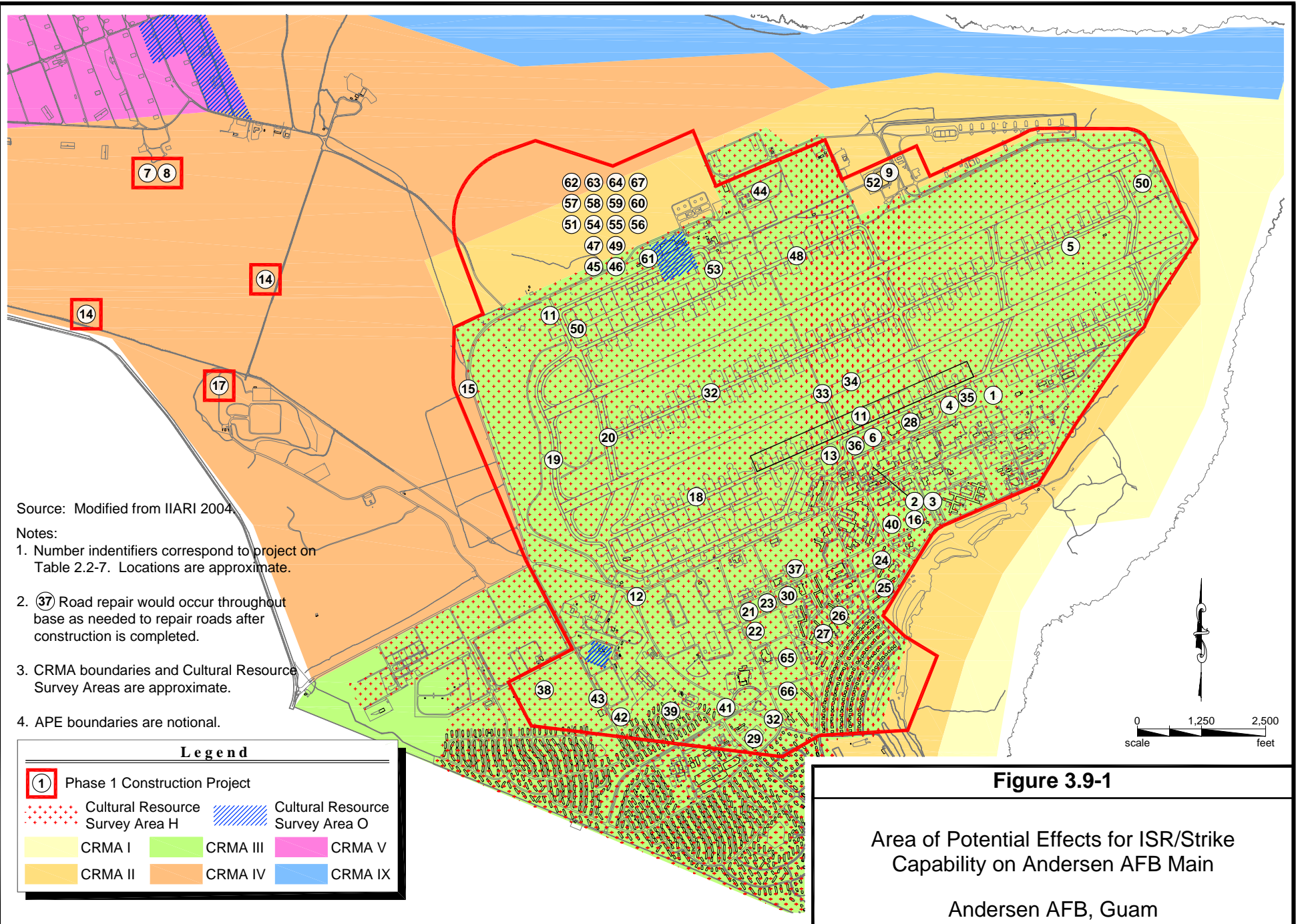
Historical events that hold great significance to world history have occurred on Guam. The meeting between Magellan and the Chamorro on Guam marked the first contact between the western world and Pacific Islanders. Later, Guam served as the first regular supply station in the Pacific, provisioning the Manila galleons on their travels between the New World and Asia. Guam's strategic position was also used early in this century; first by the U.S. Navy as a coaling port, and later by Pan American Airlines as a port-of-call for the first trans-Pacific air route flown by the Pan Am China Clippers. During WW II, Guam figured prominently in the Allied push toward Japan. The U.S. invasion of Guam was a major military effort, and Guam played a significant role in the latter stages of the war in the Pacific. More recently, Guam became an initial evacuation point for Vietnamese refugees fleeing during the fall of Saigon (Navy 1996).

Cultural resources surveys of Andersen AFB identified prehistoric and historic sites. Historic sites consist of housing ruins from the early 20th century and other support structures, such as a stone pier and water catchment basins. Sites associated with WW II have also been identified at Andersen AFB and include Northwest Field, the Mt. Santa Rosa Battle Area, Quonset huts, and ARMCO huts. The pre-WW II resources are considered significant and provide information about rural life in northern Guam during the early 20th century.

Known historic resources in the Andersen AFB area include Pre-WW II resources, WW II resources and post-WW II resources (*e.g.*, monuments and markers). Historic resources represent the First American Period (1898 to 1941) - Economic-Agriculture; the Japanese Period (1941 to 1944) - WW II; and the Second American Period (1944 to present). The Second American Period is subdivided into the WW II Period and the Post-1945 Cold War Period. There are 116 historic sites listed on the NRHP on the Island of Guam, and an additional 39 historic sites listed on the Guam Register of Historic Places (total of 155 historic sites) (GovGuam HRD 2005).

Historic building surveys and ground checks for NRHP property categories (buildings, structures, objects and sites) for resources dating from before 1950 have been completed for each of the three CRMAs that underlie the proposed sites for ISR/ Strike facility projects.

The Tarague Historic District (PN-1) is the only historic district on Andersen AFB. The Tarague Historic District is a large set of archaeological sites of all time periods in the Tarague embayment. The district is one of the most important areas on Andersen AFB for traditional Chamorro sites. The extensive coastal dune areas and caves contain remains of Chamorro settlement dating back at least 3,000 years, and are known to have been traditional burial areas. The APE does not include this historic district.



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A historic building and landscape/viewshed inventory and evaluation conducted in 2004 identified seven facilities on Andersen AFB as potentially eligible for the NRHP. These are: Facility 74, a radome tower building on Mount Santa Rosa; five storage igloos in MSA 1; and, the Munitions Support Equipment Maintenance Facility in MSA 1. With the exception of radome¹ tower constructed in 1956, all other facilities were constructed in 1954.

The igloos and munitions storage areas were built during the Cold War period when Andersen AFB was becoming the Strategic Air Command's principal base in the Pacific. The MSAs are significant under Criteria A and C, and are also a definable geographical area that can be distinguished from surrounding properties by physical separation aspects. Formation of a historic district was recommended in 2004 (Mason Architects 2004). The APE includes two proposed ISR/Strike construction projects immediately south of MSA 1: the Tactical Missile Maintenance Facility and the Conventional Missile Maintenance Facility.

The APE for proposed construction projects associated with establishment of the ISR/Strike capability is characterized by one known historic resource, a historic event site, as described on Table 3.9-2. This airfield, encompassing the entire active runway complex and located within CRMA III, meets Criterion A for inclusion on the NRHP because it is associated with events that made a significant contribution to the broad patterns of Guam history.

Table 3.9-2 Historic Resources in the APE for the ISR/Strike Capability

Site	Description	Date of Construction or Use	National Register (Date Listed)	Guam Register (Date Listed)
Munitions Storage Areas 1 and 2	Igloos and munitions storage areas constructed during the Cold War Period.	1954	Recommended as eligible in 2004	--
North Field/Andersen Airfield (Site 66-07-1064)	One of several airfields built for the U.S. Army Air Forces in WW II.	Post-Contact	Recommended eligible in 2004, based on National Register Criterion A.	Guam Register Eligibility forms prepared (undated).

Source: Navy 1996; IIARI 2004

Site 66-08-1065 comprises the site known as Northwest Field, one of five B-29 airfields built in the Marianas. Two airfields constructed on Guam were Northwest Field and North Field, in the area that is now Andersen AFB main. In August 1944, northern Guam was jungle, abandoned farms, and a few deteriorated roads. Construction of North Field began in November 1944 with the first runway completed on February 2, 1945. A second airstrip was completed in May 1956. The 314th Bombardment Wing assembled on North Field in February 1945. Its B-29s were responsible for attacks on Japan from February to June 1945. By June 1945, Northwest Field had been transformed into an operational airfield for B-29s from the 315th Bomb Wing. On 14 August 1945, B-29s from Guam left the runways for the last bombing mission of the war. The last B-29 bombs of WW II were dropped by one of the planes of the

¹ A plastic housing sheltering the antenna assembly of a radar set, especially on an airplane.

16th Bomb Group on April 15, 1945. This plane was still in the air when Japan surrendered. North Field was converted into an Air Force installation in 1947 and was renamed as Andersen AFB in 1949.

In June 1950, B-29s from the 19th Bombardment Wing on Andersen AFB bombed targets in Korea. In June 1965, B-52s from Andersen AFB raided South Vietnam. In 1971, raids on North Vietnam were accomplished by planes from Andersen AFB. The landscape of North Field has the historic significance, integrity, and landscape characteristics for inclusion on the NRHP. North Field's association with the Cold War, beginning with its use by the Strategic Air Command in 1951, meets NRHP Criterion A (association with events that have made a significant contribution to the broad patterns of our history) (Mason Architects 2004). North Field is the only Air Force airfield from which planes flew combat missions in three wars: WW II, the Korean War, and the Indochina War (Andersen AFB 2003c).

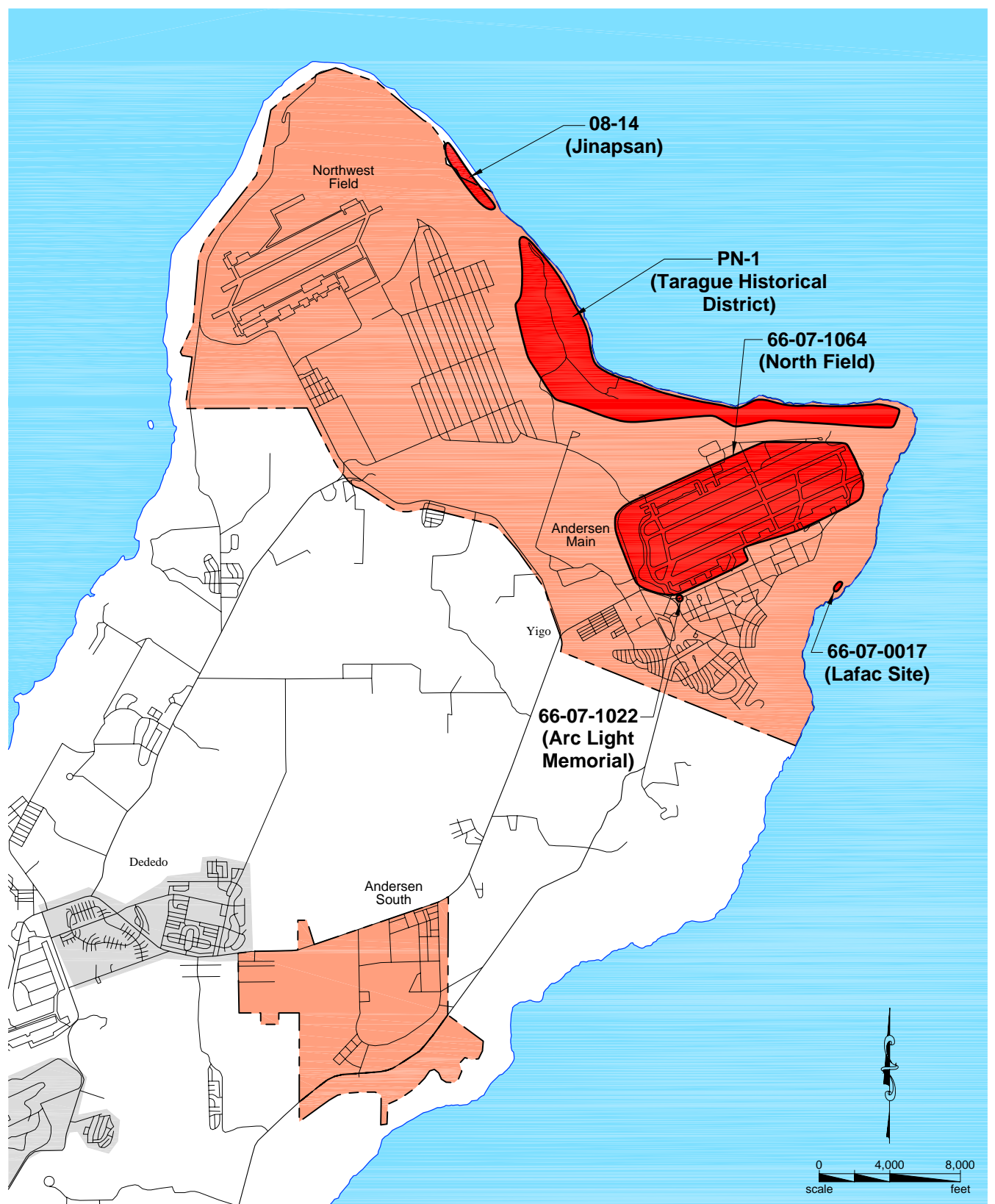
Because the original runways and taxiways of North Field have been lengthened and/or widened and other modifications made, these changes may have impaired the historical integrity associated with WW II (IIARI 2004). The boundaries of Site 66-07-1064 (North Field) are shown on Figure 3.9-2. The NRHP nomination forms for North Field were prepared in 1975. The 2004 ICRMP recommends that the Air Force complete and submit NRHP nomination forms to the GSHPO and that on-Base historic displays and commemorative plaques be considered as treatment for this maintained facility (Andersen AFB 2003c).

Both MSA 1 and MSA 2, which is on the eastern end of the north side of the airfield, meet NRHP qualifications as a historic district in that they possess a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development. Various types of storage igloos would be within the historic district. Constructed in 1954 during the Cold War period, the storage igloos are significant under Criterion A because of their association with the Air Force mission during the build-up of air power at overseas bases at the time of the Cold War in the 1950s. This was an important period as the nation defined its Cold War strategy of deterrence and as the Air Force built up its bases overseas to accommodate that strategy. MSAs 1 and 2 are also significant under NRHP Criterion C because they possess distinctive characteristics of a type of construction for ammunition storage facilities with separation distances and distinctive spatial layouts (Mason Architects 2004).

3.9.2 Archaeological Resources

Archaeological sites are places consisting of the physical remains of past human activity. Archaeological resources are fragile and non-renewable and can easily be destroyed by changes in patterns of land use.

The northern coastal flats of Guam contain a large number of cultural and archaeological sites. These sites range from midden deposits to examples of rather large *latte* villages. A *latte* is a pillar of volcanic stone or coral topped with a separate hemispherical capstone. These structures are believed to be the supporting structures for houses. They are usually found in parallel rows of similar number, length, and height. The ancient remains uncovered at Tarague date back 3,000 years, making the location one of the earliest dated sites in the Marianas. The area has been designated as the Tarague Beach Archaeological District.



Source: IIARI 2004a.



Figure 3.9-2

Historic Sites on Andersen AFB

Andersen AFB Guam

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Archaeological investigations have been conducted for almost 90 years in the area now occupied by Andersen AFB. While most of these previous surveys covered specific and often very small areas, there still remains a vast area on Andersen AFB that has not been thoroughly surveyed. The only section of Andersen AFB that has had extensive and thorough archaeological work is the Tarague Embayment studied in 1996 (the Tarague Embayment is situated along the eastern coastal section of Andersen AFB). A summary of previous investigations conducted in the area of Alternative A is provided in Table 3.9-3.

Table 3.9-3 Cultural Resources Surveys in the ISR/ Strike Project Area

Source	Description	Date of Work
Davis	Survey of Andersen Air Field; no sites recorded.	1983
Tuggle	Surface survey of two areas near Andersen AFB airfield; no sites located.	1992

Source: IIARI 2004

Previous surveys by Kurashina, *et al.* (1987) and Haun (1989) indicate that the most commonly encountered site types at Andersen AFB are likely to be small ceramic scatters. Kurashina's inventory recovered 148 Latte period sherds from 17 sites; Haun reports 23 Latte period plain sherds from a single site. The areas of these sites were often less than 50 square meters. More recent work by PHRI in MSA 2 near the ASA project indicates a higher site density and a greater diversity of artifact and feature types, as well as larger sites, in that portion of the APE (DeFant 2005). A survey by IIARI in an area between MSA 1 and Northwest Field recovered numerous broken basalt *lusong* in addition to Latte period ceramics and features from the Spanish period, possibly the first American period, and the second American period (Yee, *et al.* 2004). In all of these areas, soil depth rarely exceeds about 30 centimeters, making the probability of encountering stratified deposits unlikely. Negative surveys are also reported for fairly large areas within Andersen AFB (Davis 1983; Tuggle 1993), indicating considerable variability in site density and/or preservation.

While the stages of construction and renovation on Andersen main have been documented historically, many of the areas between the airfields and along the coast lack exact location coordinates, photographic records, and thorough descriptions. The 2003 ICRMP identified 19 cultural resource properties on Andersen AFB (Andersen AFB 2003). In 2004, the Air Force conducted an overview survey to locate incompletely recorded sites with surface reconnaissance and GPS location recordings. The status of known sites was updated, and new sites were identified during the 2004 study. Among the archaeological resources identified in 2004 were: a rock wall of dry stone masonry suggesting traditional Chamorro construction; a possible helicopter pad and airplane parts; a shelter of collapsed wood and metal which was built after the Chamorro had been contacted by the Spanish (post-Contact); a wastewater treatment plant; bedrock mortars and a cave; and the Fafalog *lusong* (mortars) area.

There are 27 cultural resource properties on Andersen AFB. The Jinapsan Complex (Site 06-08-0014) is the only site listed on the NRHP. Twenty-two properties are recommended as eligible for listing, one property has been determined eligible by the GSHPO, and three properties have not been evaluated for eligibility. The project area for the proposed

establishment of the ISR/Strike capability is characterized by one known cultural resource as described in Subchapter 3.9-1.

The project site includes areas on Andersen AFB that have not been thoroughly surveyed. Archaeological surveys have not been completed in CRMAs II or IV. Ethnographic surveys have not been completed for any of the three CRMAs in the project area. The remains of North Field have never been inventoried archaeologically, or been subjected to a detailed archival study.

Two of the three CRMAs in the project area (see Figure 3.9-1) are recommended for archaeological inventory and ethnographic surveys, and for Section 106 review if a planned project may affect archaeological properties. Table 3.9-4 provides a description of the cultural resources and potential for each of the three CRMAs in the project area. In accordance with Section 106 of the National Historic Places Act, the Air Force has initiated consultation with the GSHPO for establishment of the ISR/Strike capability on Andersen AFB (see Appendix D).

Table 3.9-4 CRMAs Underlying the Site for the ISR/Strike Capability

CRMA	Land Use and Locale	Description and Potential for Encountering Cultural Resources
II	Mixed Land Use, area around Main Operations Area	Located on the periphery of the Main Operations Area of Andersen AFB, this undeveloped area has some level areas to the northwest and steep karstic slopes to the east. This area has potential for cultural utilization in the form of resource procurement and the short or long-term habitation that procurement may necessitate. The less-than-desirable environment probably precluded permanent habitation sites.
III	Mixed Land Use, Main Operations Area	This fully developed Main Operations Area is unlikely to contain surface or subsurface cultural resources deposits. As recommended in the ICRMP cultural resource management should continue interpretation and commemorative programs.
IV	Open Space; central area of Andersen AFB	Sites and features from pre- and post-Contact times have been recorded in this large area, including traditional habitation sites (Fafalog <i>lusong</i> and artifacts). The area is located between known coastal sites that have been occupied. Limestone forest on this plateau is rich in plants of economic and subsistence importance to the pre-Contact Chamorro and early post-Contact inhabitants. The area has high potential for sites of permanent habitation and resource utilization. This area has been the least impacted by early historical and military development, and the least surveyed. Detailed survey followed by testing, data recovery and preservation planning should be considered before any alteration or development of this area occurs.

Source: IIARI 2004

3.10 SOCIOECONOMIC RESOURCES

3.10.1 Population

Andersen AFB is located at the northern end of Guam in the District of Yigo, and adjacent to Dededo. Table 3.10-1 portrays population trends from 1990-2003 for Guam and the major northern districts. The 1990 population of 133,152 for Guam reflected an annual population growth rate of 2.3 percent since 1980. According to the U.S. Census Bureau, the population of Guam in 2000 was 154,805, which included approximately 10,000 military personnel and their dependents. Guam's 2000 population reflected a 16 percent increase since 1990, or an annual growth rate of 1.5 percent, considerably less than the growth rate during the previous decade. The decrease in population growth during the past decade is assumed not to be the result of

migration by Guam residents to Hawaii and other U.S. states for employment, but rather a decline of natural population increases. The most current population estimate (2003) is 163,593, or a 5 percent increase since 2000.

Table 3.10-1 Population Trends, 1990-2003

Geographic Area	Estimated Population, 2003 ¹	Percent Population Change (1990-2000)	2000 Population ²	1990 Population ²
Guam	163,593	16	154,805	133,152
Dededo District	NA	35	42,980	31,728
Yigo District	NA	37	19,474	14,211
Tamuning District	NA	8	18,012	16,673

NA = Information not available at this geographic level.

1 Department of Public Health and Social Services, Government of Guam.

2 U.S. Department of Commerce, U.S. Census Bureau, 2000 Census.

Over 50 percent of Guam's population lives in the three northern districts of Dededo, Yigo, and Tamuning. Approximately 50 percent of the population increase in Guam during the 1990-2000 period occurred in the Dededo District. A shift in population from Guam's southern districts to the northern districts began in the early 1980s. This initial shift in population was partially due to annexation of land by the military and construction of bases. However, the existence of infrastructure has encouraged more development in the northern districts during the past two decades.

As indicated in Table 3.10-2, the local population of Guam is a heterogeneous mix of ethnic and cultural backgrounds that include Chamorro, Spanish, Filipino, Asian, Pacific Islanders, and Americans. Native Hawaiian and Other Pacific Islanders, the majority of which are descendents of the original aboriginal settlers called Chamorro, comprise 45 percent of the Island's population. Asian, primarily Filipino, account for one-third of the population, while persons consisting of a mix of races/ethnic groups comprise 14 percent of the Island's population. Only 7 percent of the local population is Caucasian. The foreign-born population has increased substantially during the past two decades, with almost one-third of the Island's population being classified as foreign-born. The majority of the foreign-born population migrated to the Island subsequent to the passage of the U.S. Compact of Free Association Act of 1985. This Act authorized unrestricted immigration of people in the Federated States of Micronesia and the Marshall Islands to the United States and its territories.

The on-Base population at Andersen AFB fluctuated widely during the past two decades as a result of military buildups and downsizings. During the 1980s, Air Force personnel stationed at the Base approached 4,000, accompanied by almost 5,000 family members. During the mid-1990s the number of military personnel at the Base began to gradually decrease. The current on-Base daytime population of Andersen AFB approximates 5,900 persons.

Table 3.10-2 Population Distribution by Ethnic Origin and Race, 2000

Ethnic Origin/Race	Number	Percent of Total Population
One Ethnicity or Race		
Native Hawaiian and Other Pacific Islander	69,039	45
(Chamorro)	(57,297)	
Asian	50,329	33
(Filipino)	(40,729)	
Caucasian	10,509	7
African American	1,568	1
Other Race or Ethnic Group	1,807	1
Two or More Races or Ethnic Groups	21,553	14
TOTAL	154,805	

Source U.S. Department of Commerce, U.S. Census Bureau, Population and Housing Profile, Guam 2000.

3.10.2 Housing

Table 3.10-3 portrays housing characteristics for the Island of Guam and the three most populated northern districts. According the 2000 U.S. Census, there were 47,677 housing units in Guam, a 35 percent increase from 1990. Over 50 percent of the housing units are in the northern three districts of Dededo, Yigo, and Tamuning. Only 48 percent of the housing units in Guam are owner-occupied, with a slightly higher owner-occupancy rate in the Dededo District and a significantly lower owner-occupancy rate in the Tamuning District. Approximately 19 percent of the housing units were classified as vacant in the 2000 U.S. Census.

Table 3.10-3 Housing Characteristics, 2000

Jurisdiction	Total Housing Units	Percent Owner-Occupied	Percent Vacant	Median Value (Owner-Occupied)	Median Monthly Contract Rent	Median Household Income
Guam	47,677	48	19	\$171,900	\$645	\$39,317
Dededo District	12,119	55	17	\$163,100	\$590	\$37,654
Tamuning District	8,108	25	27	\$273,600	\$720	\$35,343
Yigo District	5,489	43	16	\$161,800	\$609	\$37,415

Source: U.S. Department of Commerce, U.S. Census Bureau, 2000 Census.

The median value of owner-occupied housing varies widely throughout Guam. The overall median value for owner-occupied housing in Guam was \$171,900 according to the 2000 U.S. Census, with median values ranging from a low of \$152,100 in the Umatac District to a high of over \$270,000 in the Piti and Tamuning Districts. Median household income in Guam also widely varies, with a median household income of \$39,317 in 2000 as compared to \$41,994 in the United States. The Island's median household income decreased 2 percent between 1990 and

2000. Median household incomes ranged from a low of \$31,130 in the Mongmong-Toto-Maite District and Hagatna District to over \$50,000 in the Piti and Yona Districts.

The percentage of the population below the level of poverty in 2000 in Guam was 23 percent, compared to 11 percent for the United States. In the more populated districts, poverty rates ranged from a high of 33 percent in the Mongmong-Toto-Maite District in the central region, to a low of 10 percent in the Santa Rita District in the southern region of the Island.

According to the Guam Multiple Listing Service, there were 152 single-family homes listed for sale on the island in April 2005. In addition, there were 90 condominiums and townhouses listed for sale. The median asking price for single-family homes approximated \$150,000, while the median price for condominiums/townhouses was approximately \$120,000. A total of 242 single-family homes, condominiums, townhouses and apartments were also listed for rent in the Guam Multiple Listing Service. Median monthly rents ranged from \$900-\$1,000 for condominiums, townhouses, and apartments, to \$1,200-1,300 for single-family homes.

The current on-Base housing inventory at Andersen AFB consists of 1,705 family housing units and dormitory quarters with 754 spaces for unaccompanied personnel, including visiting quarters. The family housing units include the approved 2003 Housing Requirements and Market Analysis total inventory of 1,388 units, plus 360 vacant units at Andersen South and six units at Tumon Tank Farm. The baseline Housing Community Profile existing requirement is 1,093 units, resulting in a surplus of 612 family housing units. Over 75 percent of the Andersen AFB active duty personnel live on Base, with 90 percent of the dependents living on-Base.

3.10.3 Education

Education for DoD dependents in Guam is supplied by the DoD Education Agency (DoDEA) which is operated as DoD Domestic Elementary and Secondary Schools; an island-wide public school system; and private schools. The DoDEA schools on Guam were established in September 1997 and consist of two elementary/middle schools (grades K-8), and one high school (grades 9-12). North Elementary/Middle School is located on Andersen AFB, while McCool Elementary/Middle School is located on COMNAVMARIANAS property. The DoDEA high school is located on Nimitz Hill, in the former COMNAVMARIANAS headquarters. Total DoDEA school enrollment on the Island for the 2003-2004 academic year was 2,561 students. North Elementary/Middle School, completed in 2001, has an enrollment capacity for over 1,300 students, 950 elementary grades, and 350 middle school.

The Island-wide Guam Public School System is composed of five high schools; six middle schools; and 24 elementary schools. Total public school enrollment was 30,299 in the 2003-2004 academic year. A recent initiative to construct seven new public schools was announced by GovGuam. The schools are planned for northern Guam, and funding has been identified.

There are also a number of private schools on the Island. The Catholic Archdiocese of Agana operates a school system composed of 15 schools, including six elementary, six middle schools, and three high schools. Several other religious denominations also operate schools in Guam. Additionally, there are two Japanese schools, one Chinese school, and one Korean school operating on the island. Total private school enrollment in 2003-2004 was 6,266 students.

The Guam Community College, located in Mangilao, provides 11 academic and professional programs and 40 technical and vocational programs that award Associate Degrees or Certificates of Completion. Enrollment in 2003-2004 approximated 4,600 students. The University of Guam, also located in Mangilao, offers five Baccalaureate and five Masters Degree programs through five different colleges. Total enrollment at the university was 2,988 during the 2003-2004 academic year.

3.10.4 Economy

Guam's economy is cyclical, and has been volatile since the early 1990s, suffering major economic downturns that continue into the 21st century. Contributing factors to the Island's economic downturn included Japan's weakening economy and financial problems; a decline in U.S. defense spending and cutbacks in military personnel on the Island; devastating typhoons; and post-September 11, 2001 travel/security concerns.

Japanese visitors to Guam totaled over 1 million in 1997, but declined to less than 800,000 in 2002. In addition, post September 11, 2001 terrorist attacks in New York City contributed to a decline in the tourism industry as monthly tourist traffic declined 50 percent or more. More recently, the Iraq War and the Severe Acute Respiratory Syndrome epidemic in Asia further contributed to a decline in the local tourist industry.

Typhoons also adversely impacted the Island's economy in 1992, 1997, and 2002, and inflicted major damages to Guam's infrastructure and ecosystem.

U.S. defense spending in Guam also decreased significantly, from \$735 million in 1994 to \$451 million in 2000. The number of active duty military personnel declined from over 11,000 in 1992 to less than 6,000 in 2000, and many civilian jobs, directly and indirectly dependent on the military, were also subsequently lost.

Guam's economy, however, has begun to stabilize from its years-long economic slump. Beginning in 2001, Federal military and civilian spending on the Island began to increase. In 2002, Federal defense and non-defense spending increased to over \$1.1 billion, approximately the same level of spending as in 1994. The total impact of federal dollars, including both defense and non-defense expenditures on Guam is greater than the revenue received from Japanese tourists. The local impact of Federal dollars is further realized as military and civilian employees pay federal income taxes to the Guam Treasury rather than the U.S. Treasury.

Table 3.10-4 presents the civilian labor force, employment, and unemployment rate for Guam for the 1999-2004 period. The 2004 civilian labor force of 61,520 represented a decrease of almost 15 percent 1999. Total employment in Guam in March 2004 was approximately 57,000, or an 8 percent decrease from 1999. Guam's unemployment rate in March 2004 was 7.7 percent compared to an unemployment rate of 6.0 percent in the United States. However, the Island's 2004 unemployment rate decreased significantly from the preceding years as indicated in Table 3.11-4. Of the total who were employed, the number of immigrant workers increased from 2002 to more than 20 percent of civilian employment in 2004. These recent gains in overall employment are primarily due to typhoon recovery construction projects and recovery of other economic factors from previously depressed levels.

Table 3.10-4 Civilian Labor Force, Employment, and Unemployment Rate Trends, 1999-2004

	2004 ²	2002	2001	2000	1999
Civilian Labor Force ¹	61,520	62,050	64,800	70,800	72,700
Total Employment	56,810	54,980	56,040	59,950	61,640
Unemployment Rate	7.7	11.4	13.5	15.3	15.2

¹ Includes civilians 16 years of age and over, but excludes non-immigrant aliens and members of U.S. Armed Forces and their dependents living on military bases.

² As of March 2004.

Source: Government of Guam, Department of Labor, Bureau of Labor Statistic; State of Hawaii, Labor Area News.

In addition to the decline in the civilian labor force during this 4-year period, the civilian labor force as a share of the total population also declined. The decrease in the civilian labor force is consistent with the decrease in the population growth rate of the 1990s. As a result of the employment slump in construction industry related to the overall economic downturn, there has been some out-migration of workers to Hawaii and other states. The lack of a sufficient labor pool, especially skilled workers, presents a major obstacle, especially for the construction industry. Consequently, the shortage of local labor has resulted in the need to bring in contract workers from outside Guam. Table 3.10-5 displays the distribution of employment in Guam by industry sector for 2004.

Table 3.10-5 Payroll Employment By Industry Sector, 2004

Industry Sector	Payroll Employment, 2004 ¹	Percent of Total Employment
Agriculture	260	<1
Construction	4,960	8.6
Manufacturing	1,560	2.7
Transp., Comm., Util.	4,620	8.0
Wholesale Trade	1,800	3.1
Retail Trade	12,350	21.5
Fin., Ins., Real Est.	2,360	4.1
Services	14,560	25.2
Federal Government	3,320	5.8
Guam Government	11,610	20.2
Total	57,400	100.0

¹As of December 2004.

Source: Government of Guam, Department of Labor Bureau of Labor Statistics.

Table 3.10-6 presents the number of building permits issued and total construction costs for Guam for the period from 1995-2004. Over 15,000 permits, with associated construction costs close to \$2.1 billion, were issued during this period. Approximately one-third of the total permits issued were for residential structures.

Andersen AFB is a major contributor to Guam's economy by way of direct military and civilian employment, subsequent creation of indirect employment, and the purchase of goods and services from local businesses. The total annual estimated economic impact by Andersen AFB to Guam is approximately \$314 million. The annual military payroll is \$95 million, while the annual civilian payroll is \$28 million. In addition, the Base has annual construction programs, contracts, and procurement for materials, equipment, and services totaling \$175 million. As a result of the 3,267 military and civilian jobs directly created by Andersen AFB, an additional 1,056 indirect jobs are created with an annual payroll value of \$23 million.

Table 3.10-6 Building Permits Issued and Construction Costs, 1995-2004

Year	Total Permits Issued	Total Construction Cost (\$million)
2004	1,348	100.9
2003	1,578	125.6
2002	856	95.3
2001	1,082	147.9
2000	1,279	151.7
1999	1,892	174.1
1998	2,554	352.3
1997	1,615	280.1
1996	1,839	334.5
1995	1,754	348.9
Total	15,797	2,111.3

Source: Government of Guam, Department of Public Works, Building Permits and Inspection Section.

3.11 AIRFIELD OPERATIONS, AIRCRAFT SAFETY, AND BIRD/WILDLIFE-AIRCRAFT STRIKE HAZARD

3.11.1 Airfield Operations

The airspace around Andersen AFB used for analysis is the airspace allocated to the Andersen AFB air traffic control tower and which extends out to about 5 miles and up to about 2,500 feet AGL. Guam Approach and Departure Control provides radar service to aircraft arriving and departing the Base, and the air traffic control tower controls airfield operations at the Base. There are four instrument approaches available for arrivals to the airfield. The airfield has two runways, 06Left/24Right (06L/24R) and 06Right/24Left (06R/24L). Runway 06R/24L is 10,594 feet long and 200 feet wide, while Runway 06L/24R is 11,168 feet long and 150 feet wide.

Tower-controlled traffic patterns are flown at approximately 1,000 feet AGL for rectangular patterns (typically flown by large aircraft), 1,500 feet AGL for overhead patterns (flown by fighter aircraft), and 500 feet AGL for helicopters. The airfield elevation is 627 feet above MSL and the air traffic control tower is operational 24 hours a day year around. Aircraft overflight along the Andersen AFB cliff line is restricted to 1,000 feet AGL or above due to environmental sensitivity (FLIP 2005). The following overflight conditions were negotiated with the USFWS in May 1997 (USPACOM 1999).

- There will be no overflight of MSA 1 below 1,000 feet AGL at any time.
- There will be no overflight of Mariana crow territories below 1,000 feet AGL from September to May. Overflight below 1,000 feet AGL is allowed between June and August, the crow non-breeding season. Crow nesting territories are identified by DAWR and updates will be provided to Andersen AFB environmental (36 CES/CEV) and aircraft operations (36th Operations Support Squadron) staffs.
- Helicopters will remain 0.5 mile from the perimeter of the Mariana fruit bat colony at Pati Point, with the exception of flights originating from the end of the runways.
- This information will be briefed to all aircrews and air traffic controllers.

Approximately 86 percent of the annual airfield operations at Andersen AFB are accomplished by based Navy HSC-25 UH-60 helicopters, and about 81 percent of the UH-60 operations are closed pattern operations. The remaining 14 percent of the airfield operations are accomplished by transient fighter, bomber, tanker, transport, and civil aircraft. Table 2.3-1 presents the Andersen AFB airfield operations. Based on information in the Air Force Handbook 32-1084, *Facility Requirements*, it is estimated the capacity of the Andersen AFB airfield is 355,000 annual operations. The 85,734 annual operations accomplished under the baseline condition equate to about 24 percent of airfield capacity.

3.11.2 Aircraft Safety

Areas around airports are exposed to the possibility of aircraft accidents, even with well-maintained aircraft and highly trained aircrews. Despite stringent maintenance requirements and countless hours of training, past history makes it clear that accidents are going to occur.

The risk of people on the ground being killed or injured by aircraft accidents is miniscule. However, an aircraft accident is a high-consequence event and, when a crash does occur, the result is often catastrophic. Because of this, the Air Force does not attempt to base its safety standards on accident probabilities. Instead, the Air Force approaches safety from a land-use-planning perspective through its AICUZ program. Designation of safety zones around the airfield and restriction of incompatible land uses reduces the public's exposure to safety hazards.

Subchapter 3.2 describes the CZ and APZs developed from analysis of over 800 major Air Force accidents that occurred within 10 miles of an Air Force installation between 1968 and 1995. The study found that 61 percent of the accidents were related to landing operations and 39 percent occurred during takeoff. Fighter and trainer aircraft accounted for 80 percent of the accidents, with large aircraft and helicopters accounting for the remaining 20 percent. Figure 3.11-1 depicts the three safety zones and summarizes the location of the accidents within a 10 nautical mile (NM) radius of the airfield.

Figure 3.11-1 Air Force Aircraft Accident Data (838 Accidents - 1968-1995)

		← 3,000' →		← 5,000' →		← 7,000' →		
3,000'	↑ ↓	CLEAR ZONE		ACCIDENT POTENTIAL ZONE I		ACCIDENT POTENTIAL ZONE II		3,000'
		230 Accidents (27.4%)		85 Accidents (10.1%)		47 Accidents (5.6%)		
		RUNWAY 209 Accidents (24.9%)						

Other Accidents Within 10 NM: 267 Accidents, 32.0%

The Air Force defines five categories of aircraft flight mishaps: Classes A, B, C, E, and High Accident Potential. Class A mishaps result in loss of life, permanent total disability, a total cost in excess of \$1 million, destruction of an aircraft, or damage to an aircraft beyond economical repair. Class B mishaps result in total costs ranging between \$200,000 and \$1 million or result in permanent partial disability, but do not involve fatalities. Class C mishaps result in more than \$100,000 (but less than \$200,000) in total costs, or a loss of worker productivity exceeding 8 hours. Class E mishaps represent minor incidents not meeting the criteria for Classes A through C. High Accident Potential events are significant occurrences with a high potential for causing injury, occupational illness, or damage if they occur and do not have a reportable mishap cost. Class C and E mishaps, the most common types of accidents, represent relatively unimportant incidents because they generally involve minor damages and injuries, and they rarely affect property or the public.

Class A mishaps are the most serious of aircraft-related accidents and represent the category of mishap most likely to result in a crash. Table 3.11-1 lists the 10-year Class A mishap rates for the aircraft associated with establishment of the ISR/Strike capability at Andersen AFB. The table reflects the Air Force-wide data for all elements of all missions and sorties for each aircraft type.

Table 3.11-1 10-Year Fighter, Tanker, and Bomber Class A Aircraft Mishap Information

Aircraft	10-Year Average Class A Mishap Rate
F-15	2.04
KC-135	0.09
B-1	2.40
B-2	0.00
B-52	0.41

Note: The mishap rate is a 10-year (FY93-FY02) average based on the total mishaps and 100,000 flying hours. Data for the F-15 are used for the fighter aircraft because the Air Force Class A Mishap data do not include the F-22. No data are available for the Global Hawk.

Source: USAF 2005b.

3.11.3 Bird/Wildlife-Aircraft Strike Hazard

Bird strikes constitute a safety concern because of the potential for damage to aircraft, injury to aircrews, or local populations if an aircraft strike and subsequent aircraft accident should occur in a populated area. Aircraft may encounter birds at altitudes of 30,000 feet MSL or

higher; however, most birds fly close to the ground. Over 95 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 49 percent of bird strikes occur in the airport environment, and 15 percent during low-level cruise (USAF 2003c). About 90 percent of the low-level cruise strikes occur between 300 and 5,000 feet AGL, the altitude range for most military training route operations (USAF 2003d). Table 3.11-2 contains the distribution by of Air Force bird/wildlife aircraft strikes by altitudes at airports.

Table 3.11-2 Air Force Bird/Wildlife Aircraft Strikes by Altitudes at Airports

Altitude (feet AGL)	Percent of Total
0-49	28.90%
50-99	10.88%
100-199	6.71%
200-299	6.81%
300-399	5.40%
400-499	2.48%
500-599	5.85%
600-699	1.46%
700-799	1.34%
800-899	1.76%
900-999	0.64%
1,000-1,499	7.21%
1,500-1,999	6.78%
2,000-2,999	7.01%
3,000-3,999	4.58%
4,000-4,999	0.98%
5,000 and greater	1.22%

Source: AFSC 2006..

AFI 91-202 requires that Air Force installations supporting a flying mission have a BASH plan for the base. The Andersen AFB plan provides guidance for reducing the incidents of bird strikes in and around areas where flying operations are being conducted. The plan is reviewed annually and updated as needed.

Table 3.11-3 lists the 8-year average (1997 through 2004) bird/wildlife aircraft strike information for Andersen AFB and the average strikes per airfield operation (see Table 2.3-1 for airfield operations data). None of the bird/wildlife aircraft strikes resulted in a Class A mishap.

Table 3.11-3 Andersen AFB Bird/Wildlife-Aircraft Strike Information

Quarter	8-Year Average	Average Strikes per Airfield Operation
January-March	0.875	0.00004
April-June	0.625	0.00003
July-September	0.250	0.00001
October-December	1.250	0.00006
Total	3.000	--

Note: Average strikes per quarter based on the 8-year average quarterly BASH strikes (1997-2004) divided by average quarterly aircraft operations.

Source: Andersen AFB 2005b.

3.12 ENVIRONMENTAL JUSTICE

On February 11, 1994, the President issued EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. According to EO 12898, federal institutions are required to make environmental justice concerns a part of their mission. In addition, they are to identify any disproportionately adverse effects to human health or the environment that their programs, activities, and policies have on minority or low-income populations. Accompanying EO 12898 was a Presidential transmittal memorandum, which referenced existing federal statutes and regulations to be used in conjunction with EO 12898. One of the items in that memorandum was the use of the policies and procedures of NEPA, specifically that, "...each Federal agency shall analyze the environmental effects, including human health, economic, and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the NEPA 42 USC Section 4321, *et seq.*" In this subchapter, relevant data regarding "environmental justice" is presented, along with an analysis of census tracts that would be affected by establishing the ISR/Strike capability at Andersen AFB. This method follows the Air Force interim guidance for environmental justice analysis dated November 1997.

3.12.1 Regional Definition

Since the analysis considers disproportionate impacts, two areas must be defined to facilitate comparison between the area actually affected and a larger regional area that serves as a basis for comparison and includes the area actually affected. The larger regional area is defined as the smallest political unit that includes the affected area and is called the community of comparison. For purposes of this analysis, the community of comparison is the Island of Guam.

The affected area is the Resource Adverse Impact Footprint (RAIF), which is the footprint of potential adverse impacts based on planned activity. For purposes of this analysis, the RAIF for the proposed action encompasses the villages (districts on the island of Guam) that could be affected by noise levels greater than a DNL of 65 dBA. These are the areas that could be affected not only by noise, but also by other effects such as air emissions during aircrew training operations. Determination of affected villages was accomplished by overlaying noise contours on village boundary data. Villages that intersected noise contour isopleths of greater than a DNL of 65 dBA, were considered to be within the RAIF.

3.12.2 Demographic Analysis

The demographic analysis provides information on the approximate locations of low-income and minority populations in the RAIF. In developing statistics for the Census of Population and Housing, the U.S. Department of Commerce, Bureau of the Census, identified small subdivisions used to group statistical census data. There are five villages in the Andersen AFB area (three on the north and two in central portions of the island).

Information from the 2000 Census of Population and Housing (International Data Base) was used to identify low-income and minority populations within the affected area. To determine whether an individual area contains a disproportionately high low-income or minority population, data for each area were compared to data for the community of comparison. Of the

five villages located near Andersen AFB, 60 percent had higher percentages of minorities, and 40 percent had higher percentages of low-income persons, than Guam, as shown in Table 3.13-1.

Table 3.13-1 Percentages of Minority and Low-Income Persons in the Project Area

Location	Percent Minority	Disproportionate	Percent Low-Income	Disproportionate
United States	10.00	--	13.10	--
Guam	93.11	Yes	23.0	Yes
Villages Near Andersen AFB				
Barrigada	95.40	Yes	17.8	No
Dededo	96.79	Yes	22.8	No
Mangilao	96.00	Yes	26.3	Yes
Tamuning	92.09	No	26.0	Yes
Yigo	85.33	No	21.6	No
Percent Disproportionate	--	60.0%	--	40.0%

Notes: (a) Disproportionality exists if the location percentage is higher than the community of comparison percentage.

(b) Low-income is defined as below poverty level in 1999, as reported in the 2000 Census of population and housing.

(c) Ethnicity and Income data are not available for the villages, and therefore was assumed to be reflective of the Guam data.

Source: USCB 2005

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CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter provides analysis of the environmental consequences, including cumulative impacts, of Alternative A, Alternative B, and the No Action Alternative. For analysis purposes, FY07 (beginning October 2006) through FY22 are assessed by year, to represent the potential annual impacts associated with the construction, aircraft beddown, and recurring aspects of the alternatives. Those impacts associated with flying operations would continue beyond FY22.

Current planning would establish the ISR/Strike capability over an estimated 16-year period. Additional aircraft and personnel would be added throughout the project, with the greatest number of aircraft and personnel occurring when the ISR/Strike capability is fully established. As the number of aircraft increases, the number of aircraft operations correspondingly increases. Thus, there would be increased potential for additional air emissions from aircraft operations and a larger area affected by aircraft noise as establishment of the ISR/Strike capability progresses. Likewise, the number of personnel would increase over time, thereby increasing the potential for impacts to infrastructure and utilities and socioeconomic resources.

As mentioned in Subchapter 2.1.1.2, there could be times when the numbers of fighters, tankers, and bombers could be less than 48, 12, and 6 aircraft, respectively. However, the greatest potential for impact to the environmental resources evaluated in this EIS would occur from the operation of 48 fighter, 12 tanker, six bomber, and four Global Hawk aircraft. The potential impacts associated with operation of reduced numbers of aircraft would be less than that from operation of the greater number of aircraft. Therefore, this EIS assesses the potential impacts from the operation of as many as 48 fighters, 12 tankers, six bombers, and four Global Hawks, and the personnel associated with these numbers of aircraft, after full ISR/Strike operational capability is established at Andersen AFB.

4.1 NOISE

The following evaluation criteria were used to determine the impacts of noise:

- The extent, if any, that the action would generate noise levels from aircraft operations and construction activities that would be greater than ambient noise levels;
- The extent, if any, that the action would cause annoyance, hearing loss, speech interference, effects on structures, and effects on wildlife; and
- The extent, if any, that the proximity of noise-sensitive receptors, such as housing and schools, to the noise source would be affected.

4.1.1 Alternative A

Noise associated with Alternative A would be generated by aircraft operations and construction activities.

4.1.1.1 Aircraft Noise

Figure 4.1-1 shows the aircraft ground tracks and Figure 4.1-2 depicts the noise exposure area at the Base after Alternative A would be fully established. Figure 4.1-3 compares

Alternative A and the No Action Alternative noise contours. The aircraft operations modeled include the average busy day aircraft operations for Alternative A (see Table 4.1-1). Approximately 5 percent of the operations would occur during the nighttime (10:00 p.m. to 7:00 a.m.), or no change when comparing Alternative A nighttime operations to the No Action Alternative.

Table 4.1-1 Alternative A Annual and Average Busy Day Airfield Operations

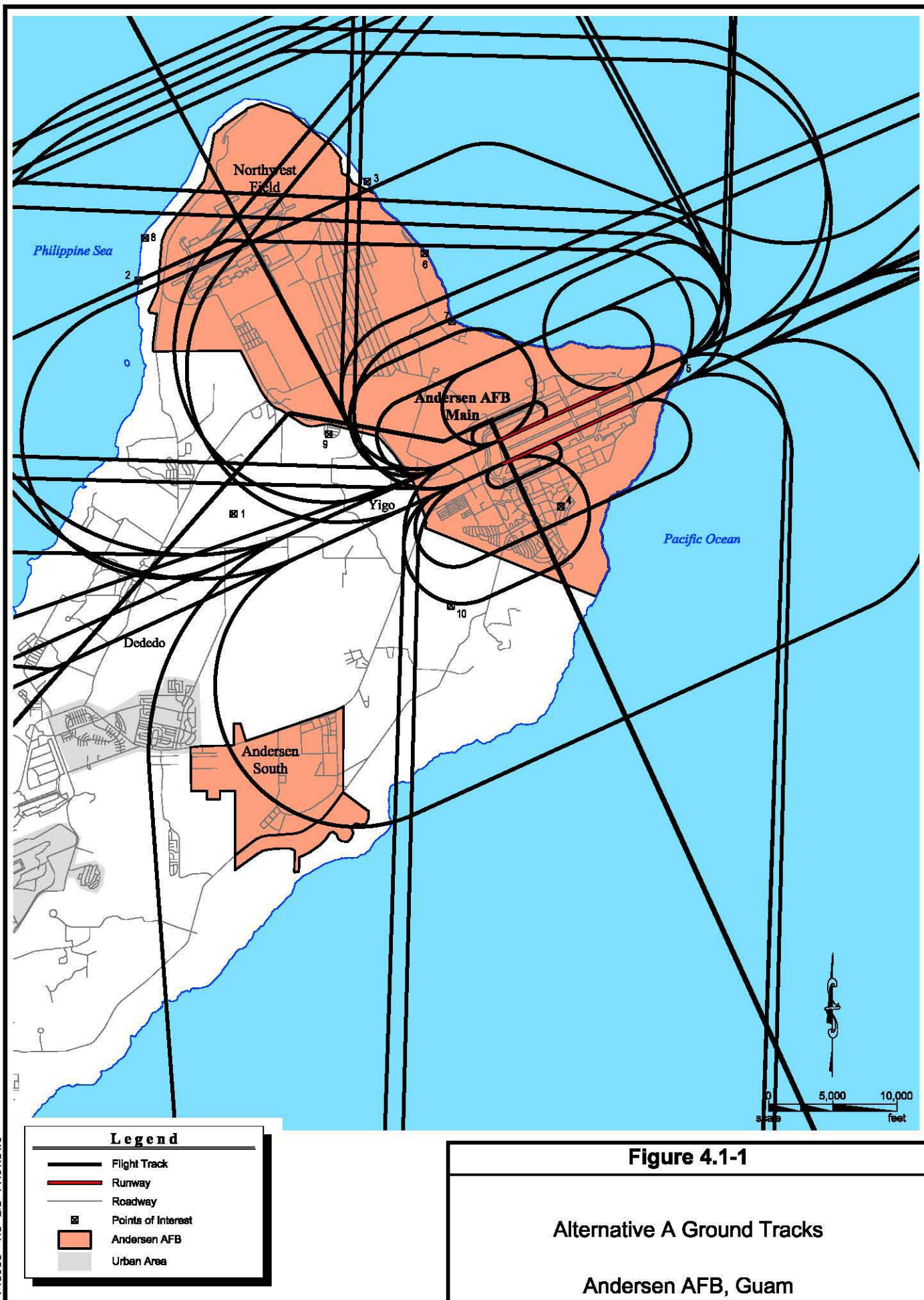
Aircraft	Arrival and Departure Operations		Closed Pattern Operations		Total Operations	
	Annual	Avg. Daily	Annual	Avg. Daily	Annual	Avg. Daily
ISR/Strike Aircraft						
Fighter						
F-22	5,530	23.04	16,589	69.12	22,119	92.16
F-15E	1,382	5.76	4,147	17.28	5,529	23.04
Fighter Subtotal	6,912	28.80	20,736	86.40	27,648	115.20
KC-135	1,920	8.00	5,760	24.00	7,680	32.00
Global Hawk	440	2.00	220	1.00	660	3.00
Bomber						
B-1	432	1.80	864	3.60	1,296	5.40
B-2	96	0.40	192	0.80	288	1.20
B-52	432	1.80	864	3.60	1,296	5.40
Bomber Subtotal	960	4.00	1,920	8.00	38,868	12.00
Subtotal ISR/Strike Aircraft	10,232	42.80	28,636	119.40	38,868	162.20
Other Military	25,144	68.88	59,648	163.42	84,792	232.30
Transient Civil	942	2.58	0	0.00	942	2.58
Total	36,318	114.26	88,284	282.82	124,602	397.08

Note: See Table 2.3-1 for detailed transient military and civil aircraft for the baseline condition.

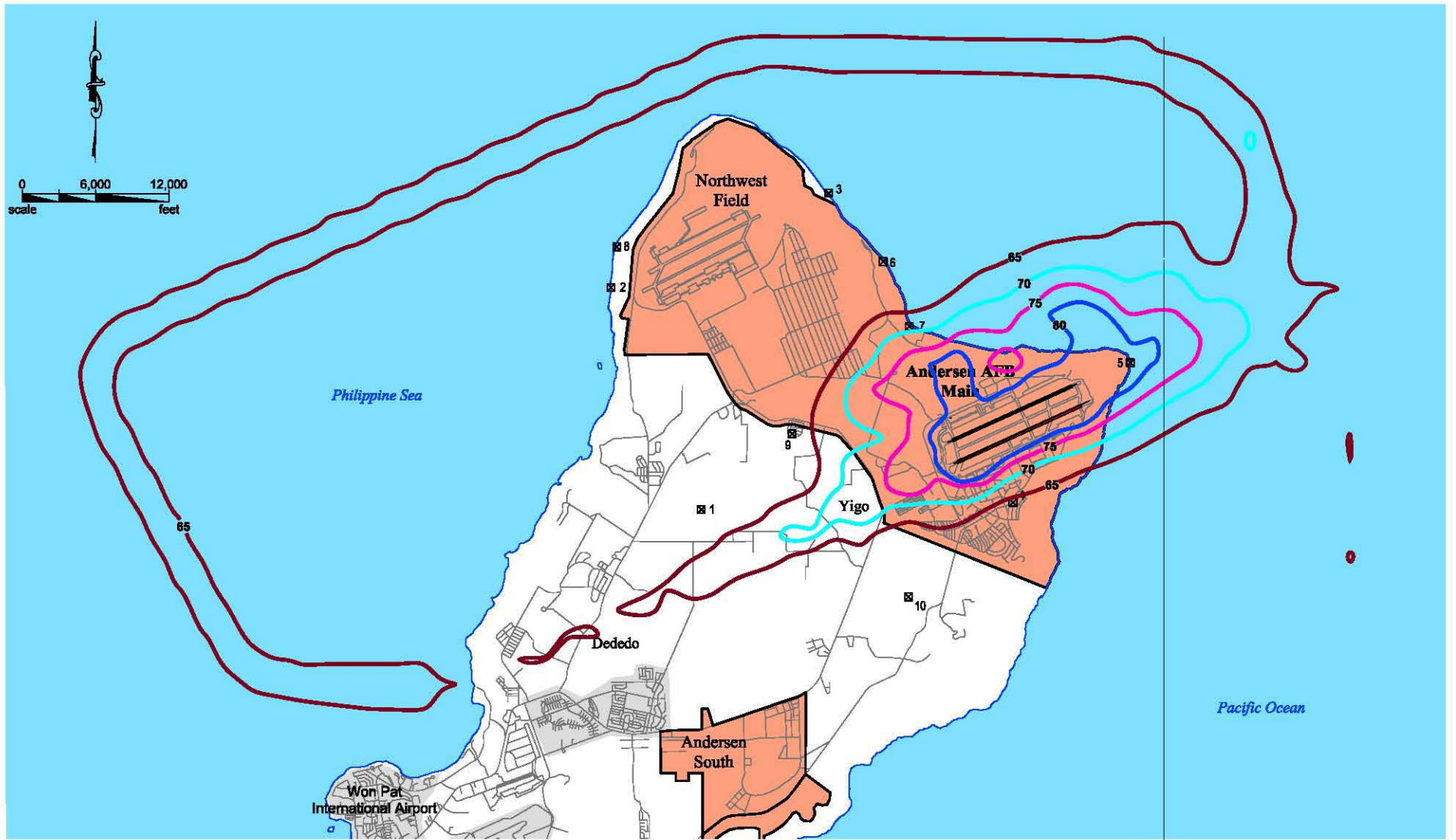
The CEQ regulations implementing NEPA recognize that a situation may occur in which data are incomplete (*i.e.*, noise data for the Global Hawk) or unavailable at the time the environmental analyses are completed. This situation is managed in accordance with 40 CFR Part 1502.22, *Incomplete or Unavailable Information*, which provides the following guidance:

When an agency is evaluating reasonably foreseeable adverse effects on the human environment in an EIS and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

- (a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the EIS.



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Legend

- | | |
|---|---|
| — DNL 65 dBA Contour | — Runway |
| — DNL 70 dBA Contour | — Roadway |
| — DNL 75 dBA Contour | Points of Interest |
| — DNL 80 dBA Contour | Andersen AFB |
| | Urban Area |

Figure 4.1-2

Alternative A Noise Contours

Andersen AFB, Guam

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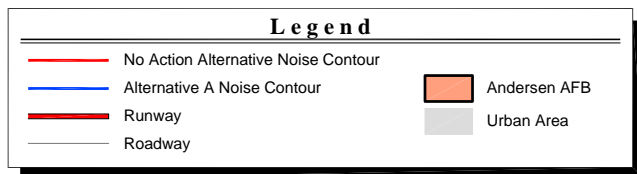
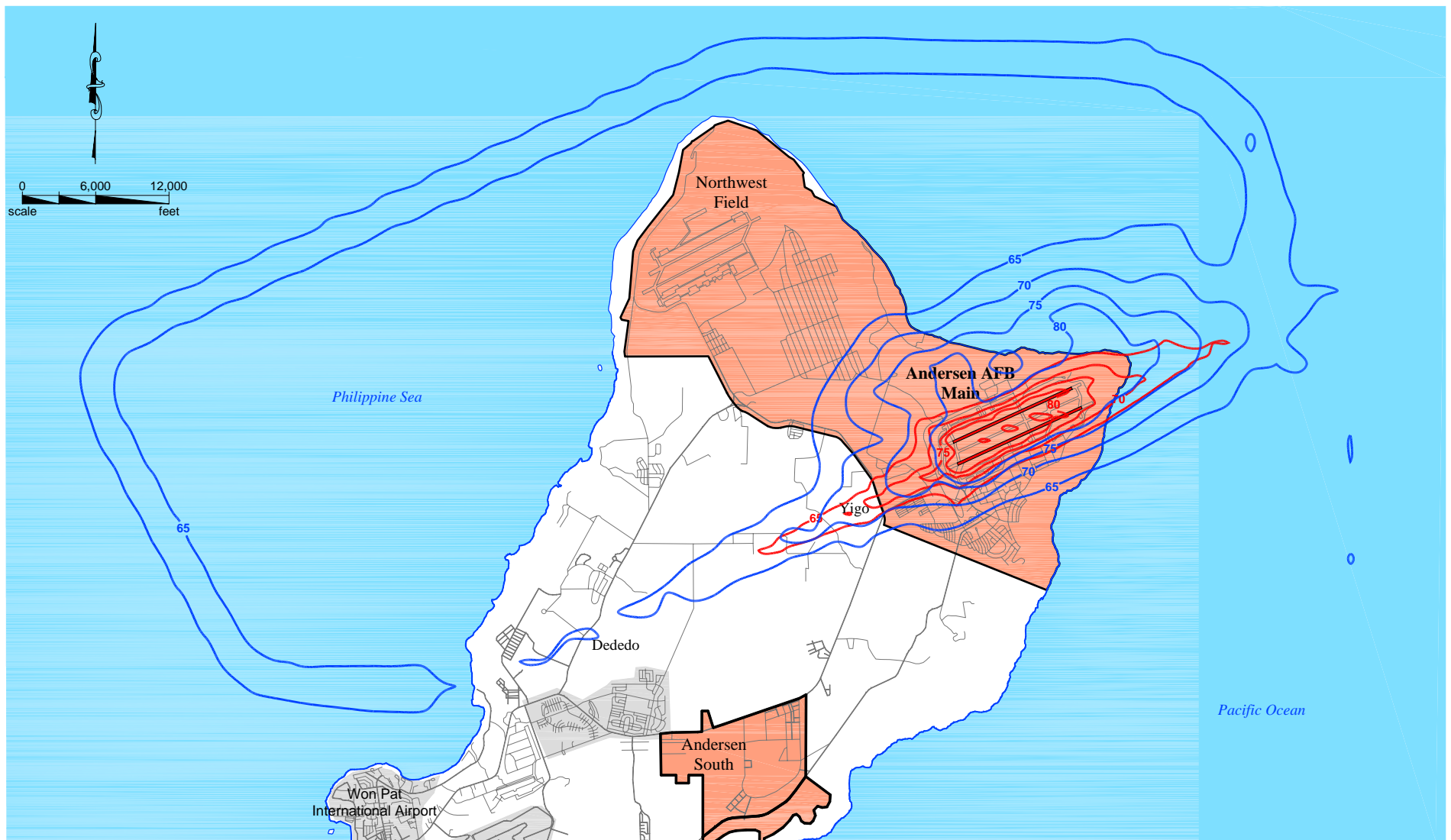


Figure 4.1-3

Comparison of No Action Alternative and
Alternative A Noise Contours

Andersen AFB, Guam

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- (b) If the information relevant to reasonably foreseeable adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the EIS the following:
- (1) A statement that such information is incomplete or unavailable;
 - (2) A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
 - (3) A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
 - (4) The agency's evaluation of such impacts based upon theoretical approaches research methods generally accepted in the scientific community. For the purposes of this Section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided the analysis of the impacts is supported with credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

The Global Hawk is a recent production aircraft. Because of its newness, complete sound data collection has not been accomplished. Therefore, it was necessary to identify a surrogate aircraft that could be used to estimate Global Hawk flight noise data. After reviewing the flight data in NOISEMAP files, Air Force acoustic scientists selected the T-45 aircraft to estimate the Global Hawk noise data. Accordingly, the T-45 aircraft was used to model the Global Hawk aircraft in the noise model [40 CFR Part 1502.22(b)(4)].

Ten representative analysis points were selected around the airfield to determine the SEL from aircraft overflight. Table 4.1-2 compares the No Action Alternative (*i.e.*, baseline) and Alternative A DNL at the 10 analysis points, and Table 4.1-3 compares the SEL at the points. There would be no change to the SEL for non-ISR/Strike aircraft because the aircraft ground tracks used by those aircraft would be the same for both Alternative A and the No Action Alternative. Table 4.1-4 compares Alternative A off-Base land area (excluding water surface) and population exposed to noise of DNL 65 dBA and greater, as well as the population potentially highly annoyed, with the No Action Alternative (*i.e.*, baseline). Table 4.1-5 provides SEL and maximum sound level values for ISR/Strike aircraft at a distance of 1,000 feet from the aircraft at takeoff thrust. The maximum sound level at the analysis point would typically be 5 to 10 dBA below the SEL value for aircraft overflight.

Table 4.1-2 Comparison of DNL from Alternative A Airfield Operations at Analysis Points

Number	Description	DNL (dBA)		
		BL	AA	Chg
1	Dededo	49	56	+7
2	Falcona Beach	47	48	+1
3	Jinapsan Beach	47	54	+7
4	Andersen AFB Middle School	55	62	+7
5	Pati Point	66	83	+17
6	Tarague Beach	44	53	+9
7	Tarague Channel	44	62	+18
8	Uruno Point	36	46	+10
9	Off-Base School	41	62	+21
10	Yigo	54	58	+4

Note: BL=baseline (i.e., No Action Alternative).

AA=Alternative A.

Chg=change.

The analysis point number and description correspond to the point as reflected on the noise contour and aircraft ground track figures. There may be minor differences when comparing the DNL for a point from the table to the DNL for the point as depicted on the noise contour figure. This difference is a result of small misalignments during the process of overlaying the noise contours on the background map.

Table 4.1-3 Comparison of SEL from Alternative A Airfield Operations at Analysis Points

Number	Description	No Action Alternative SEL (dBA)	SEL (dBA for ISR/Strike Aircraft							Comparison of Loudest ISR/Strike Aircraft to No Action Alternative
			F-22	F-15E	KC-135	B-1	B-2	B-52	Global Hawk	
1	Dededo	99	101	97	--	103	--	--	--	+2
2	Falcona Beach	108	98	86	90	91	79	--	85	-10
3	Jinapsan Beach	111	97	97	92	96	--	96	88	-14
4	Andersen AFB Middle School	103	93	89	--	102	--	--	--	-1
5	Pati Point	116	119	116	--	122	--	109	--	+6
6	Tarague Beach	98	93	96	--	83	--	--	90	-2
7	Tarague Channel	97	101	96	--	92	--	98	--	+4
8	Uruno Point	90	96	91	--	87	--	--	--	+6
9	Off-Base School	106	105	106	--	102	--	--	--	0
10	Yigo	108	98	100	--	97	92	--	--	-8

Note: The No Action Alternative also is the baseline. The SEL shown in the table is the loudest SEL for only those aircraft flying the top 20 flight tracks events contributing the most DNL at each location. NOISEMAP determines the SEL for the 20 flight track events contributing the most DNL at each analysis point. These SEL values may not necessarily be the loudest SEL values occurring at each point. It is possible for an aircraft to produce a larger SEL, but because of the infrequency of occurrence, the aircraft would not be among the top 20 contributors to the DNL level at the location. The analysis point number and description correspond to the point as reflected on the noise contour and aircraft ground track figures. See Table 3.1-1 for the aircraft producing the baseline SEL. Comparison reflects SEL from noisiest Alternative A aircraft with the baseline SEL. The maximum sound level would typically be 5 to 10 dBA below the SEL value or aircraft overflight.

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Table 4.1-4 Summary of Off-Base Land Area and Population Exposed to, and Population Potentially Highly Annoyed by DNL 65 dBA and Greater, Alternative A

	DNL Interval (dBA)				
Category	65-70	70-75	75-80	80+	Total
Acres					
No Action Alternative	353	22	0	0	375
Alternative A	1,672	483	0	0	2,155
Change	+1,319	+461	0	0	+1,780
Percent Change	+374%	+2,095%	0%	0%	+475%
Population					
No Action Alternative	242	14	0	0	256
Alternative A	2,266	300	0	0	2,566
Change	+2,024	+286	0	0	+2,310
Percent Change	+836%	+2,043%	0%	0%	+902%
Population Potentially Highly Annoyed					
No Action Alternative	53	5	0	0	58
Alternative A	499	111	0	0	610
Change	+446	+106	0	0	+552
Percent Change	+842%	+2,120%	0%	0%	+952%

Note: The No Action Alternative also is the baseline. Acres reflect only off-Base land area (excluding water surface). People highly annoyed determined by multiplying the total number of people in the noise zone times the higher percent number for the interval in Table 3.1-2.

Table 4.1-5 Sound Exposure Level and Maximum Sound Level at 1,000 Feet from ISR/Strike Aircraft

Aircraft Type	Sound Exposure (SEL) (dBA)	Maximum Sound Level (dBA)
F-22	120	116
F-15E	113	105
KC-135	94	87
B-1	124	118
B-2	109	103
B-52	111	105
Global Hawk	106	97

Note: At nominal takeoff thrust and airspeed and at a slant distance of 1,000 feet from the aircraft.

Single Event Noise Analysis

Each aircraft overflight near an analysis point yields a single-event noise level, presented as SEL. As indicated in Table 4.1-3, the SEL from ISR/Strike aircraft would be as much as 14 dBA less than the baseline condition at five of the analysis points, would be as much as 6 dBA greater at four of the analysis points, and would not change at one point. The current SEL would continue at the five points that would experience a lower SEL from ISR/Strike aircraft because

the aircraft producing the SEL under the No Action Alternative would continue to operate under Alternative A and would continue to use the existing flight tracks. A change of 3 dB is just perceptible, while a change of 5 dB is clearly noticeable (Bies and Hanson 1988).

Table 4.1-6 contains at-ear noise exposure levels that produce negligible hearing loss of no more than 5 dB for both an 8-hour and 24-hour exposure on a yearly and working day basis. The 8-hour data assumes the remaining 16 hours of the day are spent in relative quiet (USEPA 1974). According to USEPA (1974), changes in hearing levels of 5 dB are generally not considered noticeable or significant. Based on the data in the table and the level of noise exposure from the Alternative A aircraft operations in areas where people live, it is doubtful that an individual would be exposed to noise that would produce hearing loss.

Table 4.1-6 At-Ear Exposure Levels that Produce No More than 5 dB Noise Induced Hearing Damage over a 40-Year Period

Exposure	Steady (continuous) Noise	Intermittent Noise	With Margin of Safety
L_{eq} 8-Hour			
250 days per year	73.0	78.0	--
365 days per year	71.4	76.4	75.0
L_{eq} 24-Hour			
250 days per year	68.0	73.0	--70.0
365 days per year	66.4	71.4	

Source: USEPA 1974.

The nearby off- and on-Base schools would continue to be exposed to noise from aircraft operations. Research on the effects of aircraft noise on student learning suggests that aircraft noise can interfere with learning in the following areas: reading; motivation; language and speech acquisition; and memory (FICAN 2000). Research to date supports the following findings:

- “Reading. The strongest finding of a relationship between aircraft noise and learning is in the area of reading. More than 20 studies have found that children in noise impact zones are negatively affected by aircraft noise.” (FICAN 2000).
- “Motivation. Approximately a dozen laboratory and field studies indicate reduced task persistence in relation to uncontrollable noise.” (FICAN 2000).
- “Language and Speech. A small number of studies suggest delayed language acquisition and interference with speech perception in noisy areas.” (FICAN 2000).
- “Memory. A few studies suggest deficits in short- and long-term memory recall in the presence of noise, particularly for more complex material under noise.” (FICAN 2000).

As mentioned in Subchapter 2.2.1.1, the ANSI standard to achieve an hourly A-weighted average sound level of 40 dB, which must not be exceeded for more than 10 percent of the hour in classrooms, would be incorporated into the design and construction of the new on-Base high school and when existing schools on Andersen AFB are modernized. Interior noise at existing schools could be minimized by: installing additional insulation; adding a second window pane;

sealing gaps or leaks in windows and doors; replacing windows and doors with windows and doors that offer better attenuation; installing baffles in vents; and improving the exterior roofing.

Effects of Noise on Structures

Possible noise-related impacts on structures should be considered in the context of accepted research results. The recent development of larger commercial and military aircraft has prompted research into the effects of noise vibrations on both modern and historic structures.

Some building materials are more sensitive than others to external pressures and induced vibrations. Windows with large panes of glass are most vulnerable. Plaster walls in frame buildings are susceptible to cracking. Components that are least likely to experience damage are masonry walls of stone, concrete block, adobe, or brick. Appropriate building design can also reduce the possibility of damage from vibration. Research has not proven categorically that old buildings are more vulnerable to vibration than newer buildings, but prudence dictates special consideration be given to unique structures of historical significance. Table 4.1-7 lists the effects of sound on structures.

Table 4.1-7 Effects of Sound on Structures

dBA	Effects Summary	
0-127	Typical community exposures	No damage to structures No significant public reaction
127-131	(generally below 2 psf)	Rare minor damage Some public reaction
131-140	Window damage possible, increasing public reaction, particularly at night	
140-146	Incipient damage to structures	
146-171	Measured booms at minimum altitudes experienced by humans; no injury	
185	Estimated threshold for eardrum rupture (maximum overpressure)	
194	Estimated threshold for lung damage (maximum overpressure)	

Source: Speakman 1992.

Studies show that damage to structures (*e.g.*, window breakage, wall cracks, foundation cracks) from external pressures and induced vibrations would not occur at 127 dB and below (see Table 4.1-7). The highest L_{\max} produced by any of the ISR/Strike aircraft at Andersen AFB at a distance of 1,000 feet would be 118 dBA generated by the B-1 aircraft (see Table 4.1-5). The L_{\max} is the highest instantaneous sound pressure during a single noise event, no matter how long the sound may persist. The L_{\max} is different than SEL, which is the A-weighted sound level integrated over the duration of the noise event and adjusted to a length of 1 second. No damage would occur to structures in the area surrounding Andersen because the L_{\max} produced by the aircraft (*i.e.*, 118 dBA) would not exceed the level at which structural damage could occur.

Day-Night Noise Analysis

Overall, Alternative A noise contours would increase in all directions from the airfield (see Figure 4.1-2), with the number of off-Base acres (excluding water surface) in the DNL 65 dBA and greater exposure area increasing by 475 percent when compared to the No Action Alternative (*i.e.*, baseline). As indicated in Figure 4.1-3, the DNL 70 dBA contour from Alternative A southwest of the Base is nearly the same as the DNL 65 dBA contour from the No

Action Alternative (*i.e.*, baseline). The “tail” of Alternative A DNL 65 dBA contour extends about 2 miles farther southwest to Dededo, with a “detached” area of exposure beyond. The reason for the additional noise exposure is the increased number of operations by noisier ISR/Strike fighter and bomber aircraft when compared to the No Action Alternative (*i.e.*, baseline).

As indicated in Table 4.1-2, the DNL would increase at all analysis points when compared to the No Action Alternative (*i.e.*, baseline), with the greatest increase (21 dBA) occurring at Analysis Point 9 (off-Base school). Although the DNL would increase at all points, the DNL at the analysis points would exceed 65 dBA at only one point (Pati Point). The DNL at Pati Point would be 66 dBA, or 1 dBA greater than the level at which community noise effects are compared.

People would be exposed to aircraft noise in two of the four noise zones (see Table 4.1-4), with the DNL 65-70 dBA noise zone containing 2,266 of the 2,566 persons exposed to DNL 65-dBA and greater. These 2,566 persons would equate to 6.0 percent of the estimated 42,681 persons (based on 2000 census data) who live within the approximate 5-mile radius area associated with airfield airspace environment, and increase of 4.3 percent when compared to the No Action Alternative (*i.e.*, baseline). This approximate 5-mile radius area includes the airspace allocated to the air traffic control tower and is the area in which closed patterns and maneuvering for takeoffs and landings is accomplished. The density of residences in the newly exposed area would be consistent with adjacent residential areas exposed to aircraft noise under the No Action Alternative (*i.e.*, baseline). The overall number of persons who could be potentially highly annoyed by noise exposure would be 610 people, or 552 additional persons when compared to the No Action Alternative (baseline).

The contribution of outdoor noise to indoor noise is usually small. The affect of an outdoor noise source inside a building depends on the intensity of the source and the noise level reduction of the building. Noise level reduction provided by a building can be categorized into those constructed in warm climates and those in cold climates. Additionally, the noise level reduction of a building also depends on whether the windows are opened or closed (USEPA 1974). Table 4.1-8 presents typical noise level reduction for the two categories of buildings and the window open/closed condition and approximate national average noise level reduction. Based on Guam’s location in a tropical climate, the warm climate data would apply to buildings on and in the area surrounding Andersen AFB. As mentioned in Subchapter 2.2.1.1, new facilities and family housing would be constructed to achieve an indoor noise level of DNL 45 dBA or less.

Table 4.1-8 Typical Noise Level Reductions of Buildings

Climate/National Average	Windows Open	Windows Closed
Warm Climate	12 dB	24 dB
Cold Climate	17 dB	27 dB
Approximate National Average	15 dB	25 dB

Source: USEPA 1974.

Speech interference from environmental noise can occur in many settings. The primary concern is the effect of noise on face-to-face conversations, telephone conversations, and during entertainment of watching television or listening to the radio. Speech interference depends on

physical factors such as noise levels, vocal effort, distance between the talker and listener, and room acoustics and non-physical factors (speaker's enunciation, speaker's vocabulary and accent, and listener's motivation). Predictions of speech intelligibility can be based on noise levels and distances between speakers and listeners (USEPA 1974).

The highest noise level during indoor speech that permits relaxed conversation with 100 percent sentence intelligibility throughout the room is 45 dB. People raise their voices when the background noise exceeds 45-50 dB (USEPA 1974).

The sound level of speech outdoors decreases with increased distance between the speaker and listener. Table 4.1-9 presents the distances between the speaker and listener for satisfactory outdoor speech intelligibility at two levels of vocal effort at steady background noise levels. The levels for normal and raised voice satisfactory conversation presented in the table permit sentence intelligibility of 95 percent at each distance. This level of intelligibility usually permits reliable communication. If the noise levels in Table 4.1-9 are exceeded, the speaker and listener must either move closer together or expect reduced intelligibility (USEPA 1974). Based on the data in the table, listeners in normal communication at a distance of 10 feet in a steady background noise of 56 dB and who experience an increase in a background noise of 66 dB would have to move to about 3 feet apart to maintain the same intelligibility or raise their voices. Their speech intelligibility would decrease considerably if they remain at 10 feet of separation.

Table 4.1-9 Steady A-Weighted Sound Levels that Allow Communication with 95 Percent Intelligibility over Distances Outdoors for Different Voice Levels

	Distance (feet)					
	1.5	3	6.5	10	13	16
Normal Voice	72	66	60	56	54	52
Raised Voice	78	72	66	62	60	58

Source: USEPA 1974.

Nonauditory health effects of long-term noise exposure, where noise may act as a risk factor, have never been found to occur at levels below those protective against noise-induced hearing loss. Most studies attempting to clarify such health effects have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. The best scientific summary of these findings is contained in the lead paper at the National Institute of Health Conference on Noise and Hearing Loss, held on 22-24 January 1990 in Washington, D.C.

"The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an 8-hour day). At the 1988 International Congress on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss, and even above these criteria, results regarding such health effects were ambiguous. Consequently, one comes to the conclusion that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-

induced hearing loss problem but also any potential nonauditory health effects in the work place.” (Von Gierke 1990).

Although these findings were directed specifically at noise effects in the work place, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies, which purport to find such health effects, use time-average noise levels of 75 dBA and higher for their research.

For example, in an often-quoted paper, two University of California at Los Angeles (UCLA) researchers apparently found a relationship between aircraft noise levels under the approach path to Los Angeles International Airport and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dBA for the “noise-exposed” population (Meacham and Shaw 1979). Nevertheless, three other UCLA professors analyzed those same data and found no relationship between noise exposure and mortality rates (Frericks, *et al* 1980). In summary, there is no scientific basis for a claim that potential health effects exist for aircraft DNL below 75 dBA.

In summary, the following noise levels for the various conditions are sufficient to protect public health and welfare if they are not exceeded (USEPA 1974):

- DNL 55 dBA in sensitive areas (residences, schools, and hospitals);
- DNL 45 dBA inside buildings;
- Maintaining DNL 55 dBA outdoors provides protection for indoor living; and
- The 24-hour Leq should not exceed 70 db to protect against hearing damage.

Effect of Aircraft Noise on Wildlife

Subchapter 4.5 contains a detailed description of the effects of aircraft noise on wildlife, especially for the species of concern (Mariana crow and Mariana fruit bat).

4.1.1.2 Construction Noise

Assuming that noise from equipment radiates equally in all directions, the sound intensity would diminish inversely as the square of the distance from the source. Therefore, in a free field (no reflections of sound), the sound pressure level decreases 6 dB with each doubling of the distance from the source. Under most conditions, reflected sound will reduce the attenuation due to distance. Doubling the distance in a reflected sound condition may only result in a decrease of 4 to 5 dB. Table 4.1-10 shows the sound pressure levels at a distance of 50 feet for miscellaneous heavy equipment used for construction.

Numerous facilities would be constructed at Andersen AFB under Alternative A. The primary source of noise from construction activity would be from equipment and vehicles involved in construction work. Typical noise levels generated by these activities range from 75 to 89 dBA at 50 feet from the source. Noise receptors in the vicinity of these short-term activities could include persons outside the Base boundary and individuals near the facility construction projects.

For analysis purposes, it is estimated the shortest distance between a construction noise source and a receptor would be about 100 feet. Conservatively, outdoor noise for a receptor

could range from as high as 71 to 85 dB at 100 feet from the source (see note in Table 4.1-10). However, the noise level could be lower if the sound is not reflected. Indoor noise levels are generally 18 to 27 dBA lower than outdoor noise levels because building structures attenuate the outdoor noise levels. Construction and demolition activities likely would occur between 7:30 a.m. and 4:30 p.m., 5 days per week for the duration of the construction activities. The noise would be temporary and occur only during the hours that construction and demolition activity would occur and would cease when the project is completed.

Table 4.1-10 Heavy Equipment Noise Levels Measured at 50 Feet

Equipment Type	Number Used ¹	Generated Noise Levels, L _p (dB) ²
Bulldozer	1	88
Backhoe (rubber tire)	1	80
Front Loader (rubber tire)	1	80
Concrete Truck	1	75
Concrete Finisher	1	80
Crane	1	75
Asphalt Spreader	1	80
Roller	1	80
Flat Bed Truck (18 wheel)	1	75
Scraper	1	89
Trenching Machine	1	85

Note: Assuming that noise from the construction and demolition equipment radiates equally in all directions, the sound intensity would diminish inversely as the square of the distance from the source. Therefore, in a free field (no reflections of sound), the L_p decreases 6 dB with each doubling of the distance from the source. Under most conditions, reflected sound will reduce the attenuation due to distance. Therefore, doubling the distance may only result in a decrease of 4 to 5 dB (AIHA 1986).

¹ Estimated number in use at any time.

² L_p = sound pressure level

Source: CERL 1978.

Based on data in Table 3.1-2, 61 percent of the persons exposed to DNL 85 dBA could be potentially highly annoyed from the demolition noise. No hearing loss would occur for persons outdoors because they would not be exposed to DNL equal to or greater than 75 dBA for 40 years of exposure at 16 hours per day, the level at which hearing loss could occur. Sleep interference is unlikely because construction and demolition activities would occur during daytime.

Elevated noise levels can interfere with speech, causing annoyance or communication difficulties. Based on a variety of studies, DNL 75 dBA indicates a good probability for frequent speech disruption. This level produces ratings of “barely acceptable” for intelligibility of spoken material. Persons conducting conversations within the project area could have their speech disrupted by construction-generated noise. Speech disruption would be temporary, lasting only as long as the noise-producing event.

4.1.2 Alternative B

The only difference between Alternative B and Alternative A relative to aircraft operations, and therefore aircraft noise, is that KC-135 aircraft would be in a rotational status under Alternative B rather than being permanently based at Andersen AFB. The result of the difference is there would be about 16 fewer average daily KC-135 aircraft airfield closed pattern

operations. Additionally, Alternative B facilities construction and activities are identical to Alternative A except that family housing units and family housing management facilities would not be constructed under this alternative.

The types of ISR/Strike aircraft, the flight tracks that would be used, and the percent of nighttime operations under Alternative B would be the same as that for Alternative A. Noise modeling for Alternative B indicated there is no discernable difference in the Alternative B noise contours and noise exposure when compared to Alternative A (see Figure 4.1-4). Thus, the DNL for the analysis points listed in Table 4.1-2 apply to Alternative B. The SEL at analysis points would be identical to Alternative A because the aircraft flight tracks would be the same for Alternative A and Alternative B. Under Alternative B, the types of facilities that would be constructed and the spatial relationship of the facilities to nearby existing facilities would be the same as Alternative A. Therefore, the discussion, analysis, and conclusions for Alternative A for noise from aircraft operations and construction activities apply to Alternative B.

4.1.3 No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established at Andersen AFB. Noise would continue to be generated by aircraft operations and construction and demolition activities associated with individually programmed facility actions and O&M activities.

4.1.3.1 Aircraft Noise

The types and levels of activities at the Base, including airfield operations, would remain at current conditions (see Table 2.3-1). Aircraft operating at the airfield would continue to use the flight tracks depicted on Figure 3.1-3 and the noise from the operations would remain as shown on Figure 3.1-4. Approximately 5 percent of the operations would occur during the nighttime (10:00 p.m. to 7:00 a.m.). The DNL and SEL values listed in Table 3.1-1 for the analysis points would continue. Approximately 375 acres of off-Base land (not including water surface) and 256 off-Base persons would continue to be exposed to DNL 65 dBA and greater (see Table 3.1-3).

Single Event Noise Analysis

Each aircraft overflight near an analysis point yields a single-event noise level, presented as SEL. The current SEL (see Table 3.1-1) would continue at the 10 analysis points because the aircraft operating at the airfield would remain the same and they would continue to use the existing flight tracks. The hearing loss and learning discussion for Alternative A apply to the No Action Alternative.

Effects of Noise on Structures

The highest L_{\max} produced by any of the aircraft operating at Andersen AFB under the No Action Alternative at a distance of 1,000 feet would continue to be 118 dBA generated by B-1 aircraft. No damage to structures in the area surrounding Andersen AFB would occur because the sound pressure produced by the aircraft would not exceed the level at which structural damage could occur (*i.e.*, 127 dBA).

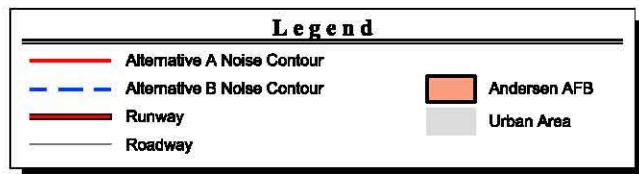
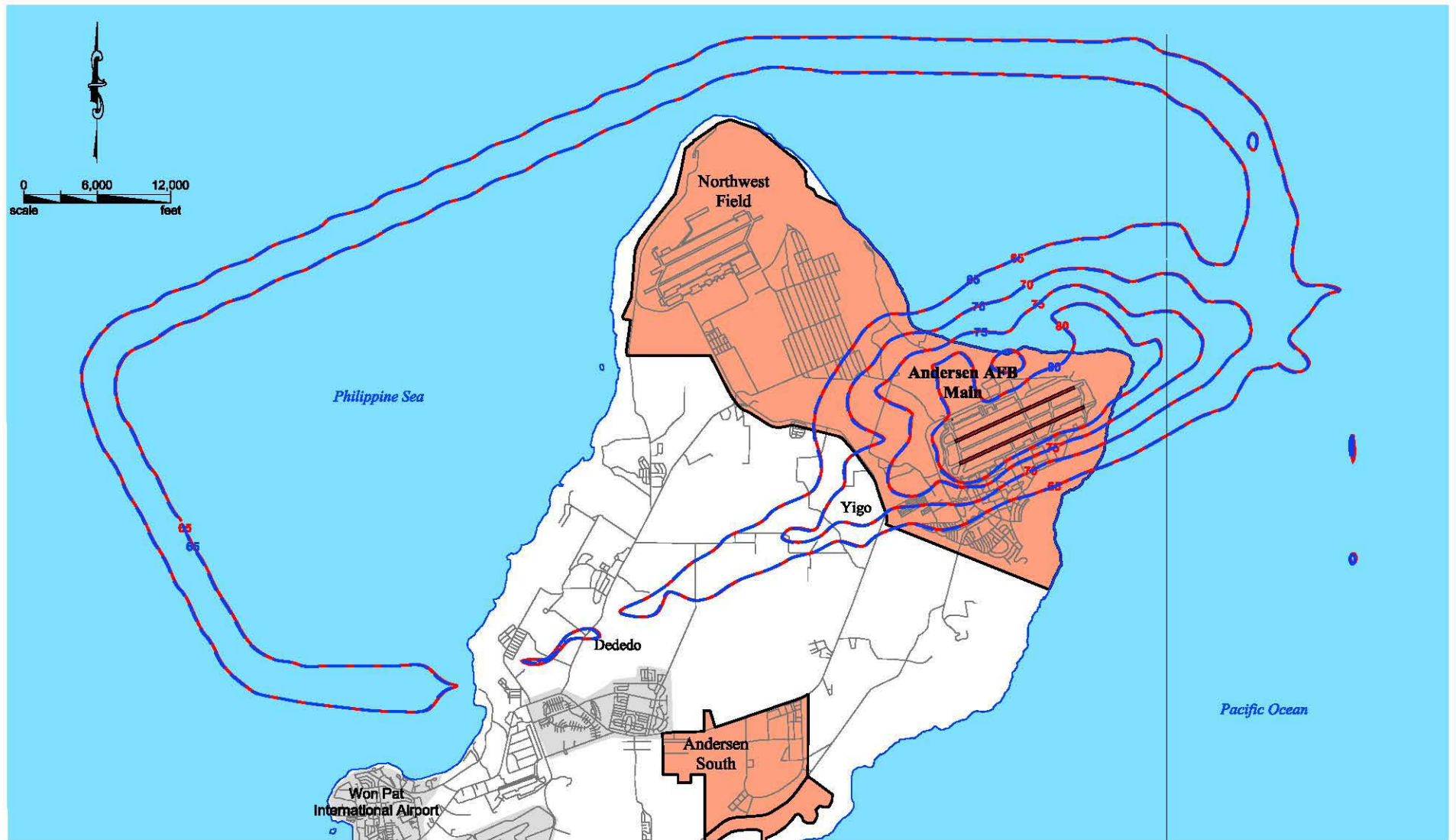


Figure 4.1-4

Comparison of Alternative A and
Alternative B Noise Contours

Andersen AFB, Guam

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Day-Night Noise Analysis

The noise exposure would remain as depicted in Figure 3.1-4. People would continue to be exposed to aircraft noise in two of the four noise zones (see Table 3.1-4), with the DNL 65-70 dBA noise zone containing 242 of the 256 persons exposed to DNL 65-dBA and greater. The other 14 people would be in the DNL 70-75 dBA noise zone. The 256 persons would equate to 0.6 percent of the estimated 42,681 persons (based on 2000 census data) who live within the airfield airspace environment.

The noise level reduction, hearing loss and nonauditory health effects discussion for Alternative A apply to the No Action Alternative. Noise-induced hearing loss would not occur from airfield operations associated with the No Action Alternative and there is no scientific basis that potential health effects exist for aircraft DNL below 75 dBA.

Effect of Aircraft Noise on Wildlife

Aircraft operations would continue to occur directly over or near some of the critical nesting habitat for the Mariana crow and the critical roosting habitat for the Mariana fruit bat. Aircraft altitude when overflying the Mariana fruit bat nesting colony at Pati Point is 900 feet AGL and greater. Aircraft altitude above the areas to the north and northwest of the airfield where Mariana crow and Mariana fruit bat nesting and/or foraging are known to occur would continue to be 1,000 feet AGL and greater.

The maximum sound levels produced under the No Action Alternative (*i.e.*, 108 dBA by the C-5 aircraft at Pati Point) would be about 2 dBA less than the maximum noise from the Morton (1996) study (*i.e.*, 110 dBA) of Mariana crow reaction to aircraft noise. Additionally, the maximum No Action Alternative sound level at any of the four other points north and northwest of the airfield where Mariana crow nesting and/or foraging is known to occur would be 104 dBA, which is approximately 6 dBA less than the Morton (1996) study. As mentioned in the Morton (1996) study, noise from aircraft overflight did not cause nest abandonment for one pair of Mariana crows when the aircraft were restricted to altitudes greater than 1,000 feet AGL. The reactions to noise the Mariana crow experiences under the baseline would continue under the No Action Alternative because the type and level of aircraft operating at Andersen AFB be similar to that found in the 1996 Morton study.

The maximum sound levels produced under the No Action Alternative (*i.e.*, 108 dBA) at Pati Point would be about 8 dBA less than the Morton (1996) study (*i.e.*, 116 dBA) of Mariana fruit bat reaction to aircraft noise. Additionally, the maximum No Action Alternative sound level at any of the four other points north and northwest of the airfield where Mariana fruit bat nesting and/or foraging is known to occur would be 104 dBA, which is approximately 12 dBA less than the Morton (1996) study. The reactions to noise that the Mariana fruit bat experiences as described in the Morton study would continue under the No Action Alternative. Subchapter 4.5 contains additional discussion and analysis for the Mariana crow and the Mariana fruit bat.

4.1.3.2 Construction Noise

Construction noise would be generated by construction and demolition activities associated with individually programmed facility actions and O&M activities. As with Alternative A, it is estimated that the shortest distance between a construction noise source and a receptor would be about 100 feet. Therefore, the annoyance, hearing loss, sleep interference, and speech disruption discussion and analysis for construction noise for Alternative A apply to the No Action Alternative.

4.1.4 Mitigation

There is potential for noise effects on the Mariana crow and the Mariana fruit bat. Subchapter 4.5 contains the impact analysis for these two species.

4.1.5 Cumulative Impacts

Alternative A

None of the other actions contain changes to aircraft operations. Therefore, there would be no cumulative noise impacts from aircraft operations. The other actions would construct facilities near the locations at which Alternative A facilities would be constructed. Receptors in the vicinity of facility construction projects associated with Alternative A and the other actions could include persons within 100 feet of noise from operating construction and demolition equipment at two adjacent construction sites. Based on the similarity of the construction and demolition activities that would occur under the other actions and for Alternative A, the analysis and conclusions associated with equipment operation for Alternative A apply to the cumulative noise environment that would occur from simultaneous construction equipment under Alternative A and other actions.

Alternative B

Except for the family housing units and family housing management facilities that would not be constructed under Alternative B, the alternative action facilities construction and activities are identical to Alternative A. Therefore, the cumulative impacts discussion and analysis for Alternative A apply to the cumulative impacts associated with Alternative B.

4.2 LAND USE

Factors considered in land use analysis include:

- The extent, if any, to which the action would require new land use category(s) in the Base General plan;
- If a land use re-categorization would be required, the extent to which the land use re-categorization would cause incompatible land uses;
- The extent, if any, that the action would preclude existing uses of adjacent or nearby properties; and
- The extent, if any, to which the action would conflict with applicable land use plans, ordinances, and/or permit requirements.

4.2.1 Alternative A

Alternative A land use activities would be consistent with the land use categories in the Base General Plan. Therefore, land uses would be compatible with the character of Base land use patterns that exist under the No Action Alternative. Facility construction and alteration activities may have a temporary minor constraint on existing operations and land uses; however, after construction, these facilities would not impact any adjacent land use.

None of the structures proposed for construction under Alternative A would be taller than the existing Base facilities. Therefore, there would be no change to the aesthetic view from adjacent off-Base properties that occurs under the No Action Alternative.

None of the facilities proposed for construction and none of the ISR/Strike activities would interfere with existing access to non-Air Force land between Andersen AFB, the Pacific Ocean, or the Philippine Sea. The existing access procedures that occur under the No Action Alternative would be continued.

Subchapter 4.10, Socioeconomics Resources, identifies the possibility of skilled U.S. workers temporarily relocating to Guam to work on ISR/Strike projects. Options for temporary housing are discussed in full in Subchapters 4.10.1.2 and 4.10.2.2. One of the options discussed includes one or more temporary housing facilities to be established and operated by construction contracting companies. These facilities could include construction of new, and/or upgrade of existing, temporary housing facilities. Such facilities have been utilized in Guam since shortly after WW II. GovGuam has extensive experience in permitting temporary housing. Construction of new facilities would be based on regulations set forth and enforced by the Guam Bureau of Statistics and Planning, the Departments of Public Health & Social Services, and Land Management. Upgrade of existing facilities would be based on the same regulations. However, upgrading existing temporary facilities may require less administrative and regulatory processing if the previous land use as temporary lodging is in force when upgrade or renovation work is considered by the construction contracting company(s). Housing facilities for temporary workers should be discouraged if the facilities are not in a compatible land use surroundings and are not supported by the availability of adequate infrastructure to the local community.

Alternative A would increase the noise exposure when compared to the No Action Alternative and the noise contours in the 2001 AICUZ Report (see Figures 4.1-3 and 3.2-2). The area southwest of the Base could experience land use noise impacts due to the increased noise exposure. As mentioned in Subchapter 3.2, most of the off-Base land in the immediate vicinity of Andersen main base is undeveloped or residential with low to moderate density. Based on the increased area of exposure and the AICUZ program guidance for updating the most recent AICUZ report, Andersen AFB would prepare an update to the 2001 AICUZ Report to identify potential land use incompatibility from aircraft noise.

There would be no change in the location or the dimensions of CZs, APZ Is, and APZ IIs associated with Runways 06 Left and Right. As mentioned in Subchapter 3.2, development in APZ II would continue to be limited because of the importance of the recharge capability of the land. The 56.66 hectares (140 acres) of residential land in the APZ II associated with Runways 06

Comment. Is the AICUZ zone being widened in light of the additional runways that are being considered?

Response: The analysis in the FEIS was improved and modified by adding CZs and APZs I the text in Subchapter 4.2.1.

Left and Right under the No Action Alternative would continue to be considered incompatible under the safety element of the AICUZ program. For these reasons, there should be no change to the 2001 AICUZ Report when considering the safety element of the AICUZ program and the assumption there has been no substantial growth in the APZ II associated with Runways 06 Left and Right.

In accordance with AICUZ program guidance, Andersen AFB would provide the proposed action noise contours and land use sections of NEPA documentation and any other relative data to local planning agencies to serve as an interim AICUZ report within 90 days of the decision to proceed with the proposed action. A full update to the AICUZ Report would be provided to the community within 1 year after the completed mission change.

4.2.2 Alternative B

Except for the family housing units and family housing management facilities that would not be constructed under Alternative B, the alternative facilities construction and activities are identical to Alternative A. Therefore, the discussion and analysis for Alternative A apply to Alternative B.

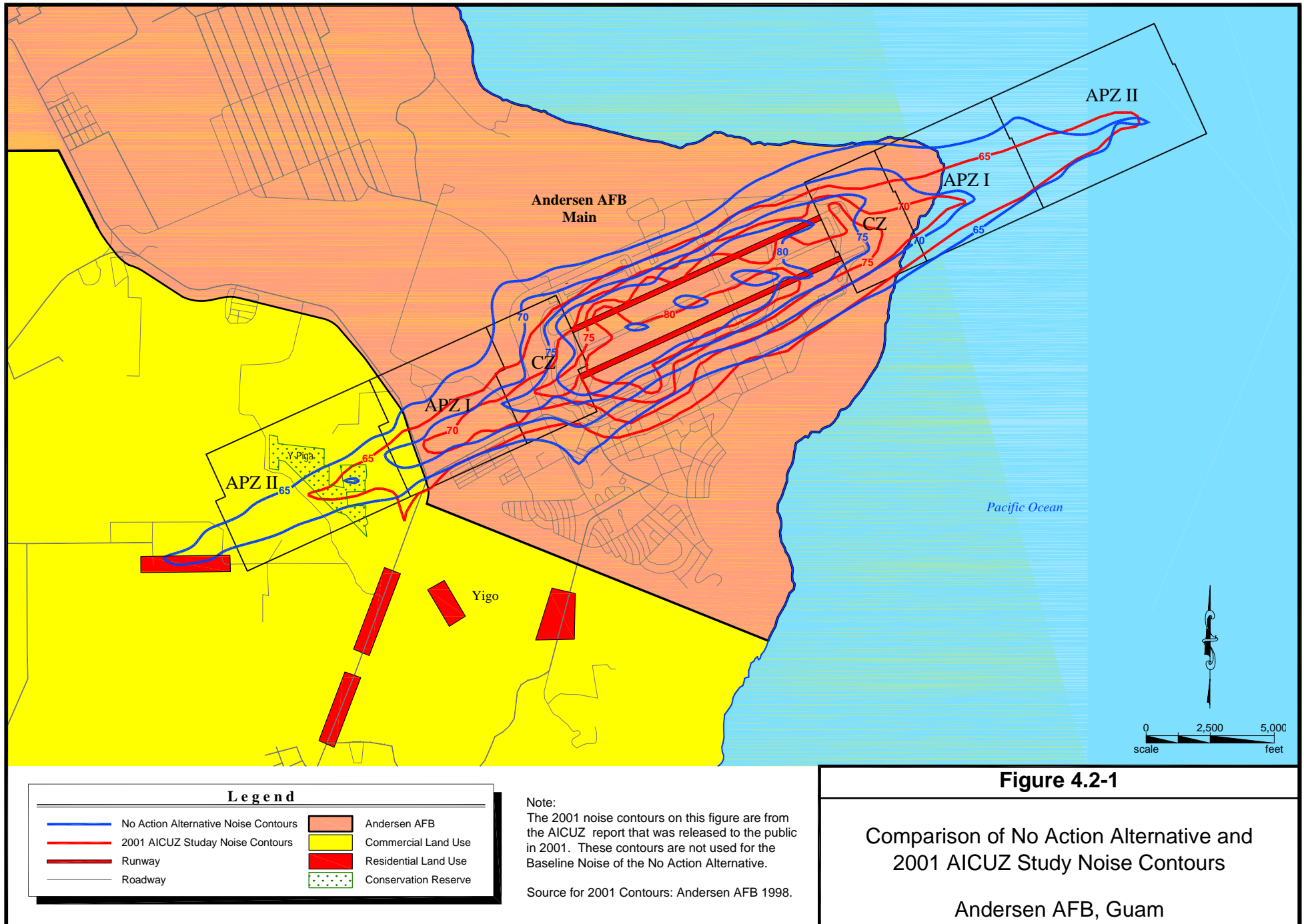
4.2.3 No Action Alternative

The ISR/Strike capability would not be established at Andersen AFB and the Base activities would continue at baseline conditions. Continuation of the current activities would be consistent with the land use categories in the General Plan. Any facilities actions at Andersen AFB would be accomplished in accordance with the Base's General Plan.

As indicated in the note on Figure 3.2-2, the noise contours used to prepare the current Andersen AFB AICUZ Study are not the same as the baseline noise contours in this EIS. This condition occurs because the aircraft operations used to prepare the noise contours for the 2001 AICUZ Study reflect operations for 1998, and the baseline contours in this EIS (*i.e.*, No Action Alternative) are based on the more recent 2003 operations. As indicated in Figure 4.2-1, the DNL 65 dBA noise contour for the No Action Alternative extends over one mile farther to the southwest when compared to the DNL 65 dBA noise contour in the AICUZ Study. Therefore, the No Action Alternative exposes additional land area to aircraft noise when compared to that reflected in the current AICUZ Study.

The additional land area could be affected by the increased noise exposure. As mentioned in Subchapter 3.2, most of the off-Base land in the immediate vicinity of Andersen main base is undeveloped or residential with low to moderate density. Based on the increased area of exposure and the AICUZ program guidance for updating the most recent AICUZ report, Andersen AFB would prepare an update to the 2001 AICUZ Report to identify potential land use incompatibility from aircraft noise.

There would be no change in the location or the dimensions of APZ II associated with Runways 06 Left and Right. Therefore, no change to the 2001 AICUZ Report would be necessary when considering the safety element of the AICUZ program.



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4.2.4 Mitigation

There would be no land use impacts from either Alternative A or Alternative B that require mitigation.

4.2.5 Cumulative Impacts

Alternative A

Other facilities would be constructed on Andersen AFB and some of the other actions would be in the general area associated with construction of ISR/Strike facilities. As with the ISR/Strike facilities, the other facility actions would be accomplished in accordance with the Andersen AFB General Plan. Thus, ISR/Strike and the other action facility construction would be consistent with land use plans and programs identified in the General Plan. None of the other facilities that would be constructed would interfere with existing access to non-Air Force land between Andersen AFB, the Pacific Ocean, or the Philippine Sea. The existing access procedures that occur under the No Action Alternative would be continued.

Alternative B

Except for the family housing units and family housing management facilities that would not be constructed under Alternative B, facilities construction and activities are identical to Alternative A. Therefore, the cumulative impact discussion and analysis for Alternative A apply Alternative B.

4.3 AIR QUALITY

Evaluation criteria considered in air quality analysis include:

- The extent, if any, that the emissions from the action would cause or contribute to a violation of any national or Guam ambient air quality standard; and
- The extent, if any, that emissions from the action would be 10 percent or more of the affected AQCR or air basin emissions inventory and be considered regionally significant.

Normally, criteria air pollutant emissions would be compared to a regional air pollutant emissions inventory to determine significance. If emissions from the action equaled or exceeded 10 percent of the region's total emissions, the emissions would be considered significant. Because Guam does not have a regional emission inventory to determine whether emissions from the action would be significant, the major source threshold for new major sources in attainment areas – the 250 tpy PSD threshold – is the criteria used for determining significance of air emissions from Alternatives A and B.

4.3.1 Alternative A

Under Alternative A, facilities would be constructed, altered, and expanded; aircraft operations would increase; and the on-Base population would increase. Construction, alteration, and expansion project emissions would be considered short-term emissions. Emissions from aircraft, AGE, and POV operations would be considered recurring emissions.

Facility construction, addition, and alteration projects would begin in FY07. A project duration of 12 months was used to determine construction emissions if a project duration was not listed for a specific project. Because construction activities would occur over a 16-year period, the total construction/demolition emissions were calculated for all proposed projects and then divided by 16 to determine the average annual emissions.

Aircraft operations were calculated using the emission factors from the United States Air Force Institute for Environmental, Safety, & Occupational Health Risk Analysis document *Air Emissions Inventory Guidance for Mobile Sources at Air Force Installations, January 2002 (Revised December 2003)* and the aircraft operations listed in Table 2.2-2. AGE emission estimates were calculated using the Emissions Dispersion Modeling System computer program. The number and type of AGE units associated with aircraft were taken from the default list used for each type of aircraft by the computer program.

Neither the *Emissions Inventory Guidance for Mobile Sources at Air Force Installations* nor the Emissions Dispersion Modeling System have the emissions factors for the Global Hawk aircraft, which has a variation of the C-130J engine. However, the guidance does not have emissions factors for the C-130J engine either. Thus, the emissions factors for the C-130H engine were used to calculate the emissions from Global Hawk operations [40 CFR Part 1502.22(b)4]. The on-Base population would increase by 3,000 personnel as a result of the Proposed Action. Emissions from POVs include vehicle operation by permanently based personnel and their dependents. POV emission estimates were based on data from the 2003 Mobile Source Air Emission Inventory (USAF 2005c). The POV values for this analysis were based on a ratio of personnel for the 2003 analysis to the personnel for the 2005 analysis.

Construction emissions presented in Table 4.3-1 include the estimated annual emissions from construction equipment exhaust, paving operations, and dust from ground-disturbing activities associated with Alternative A. It is estimated the construction, demolition, renovation, and paving activity would last about 16 years and that ground-disturbing activities would occur for about half of the project duration. Construction emissions would produce slightly elevated air pollutant concentrations. However, the effects would be temporary, fall off rapidly with distance from the proposed construction site, and would not result in any long-term impacts. None of the short term emissions associated with Alternative A exceed PSD levels.

Review of data in Table 4.3-1 for Andersen AFB indicates that emissions from full ISR/Strike capability recurring activities (*i.e.*, aircraft, AGE, and POV operations) would cause an increase in the criteria pollutants when compared to the No Action Alternative. The greatest portion of the recurring PM₁₀ emissions would be caused by POV emissions. None of the full ISR/Strike capability recurring emissions associated with Alternative A would exceed PSD levels.

Table 4.3-1 Alternative A Air Emissions

Criteria Air Pollutant	CO (tpy)	VOC (tpy)	NOx (tpy)	SOx (tpy)	PM ₁₀ (tpy)
Total No Action Alternative Emissions	433.6	201.8	299.6	36.9	134
Alternative A Emissions					
Short Term Emissions					
Construction/Demolition	5.8	1.2	13.2	1.4	3.9
Full ISR/Strike Capability Recurring Emissions					
Aircraft Emissions	31.0	7.8	14.8	2.5	4.4
AGE Emissions	1.2	0.4	4.3	0.5	0.3
POV Emissions	56.6	4.1	6.5	0.7	40.7
Fuel Cell Maintenance Emissions	0.0	0.3	0.0	0.0	0.0
Corrosion Control Emissions	0.0	0.4	0.0	0.0	0.3
Total Recurring Alternative A Emissions	88.8	13.0	25.6	3.7	45.7
PSD Levels*					
	250	250	250	250	250

* Guam Regulations 1105

Note: VOC is not a criteria air pollutant. However, VOC is reported because, as an ozone precursor, it is a controlled pollutant

According to the Pilot Testing and Resource Capability and Resource Valuation Assessment conducted in 2005 (Andersen 2005c), aggregate HAP emissions could increase from the 2003 inventory amount by as much as nine times before reaching the regulatory limit of 25 tpy. None of the aspects of Alternative A would result in an increase of nine times the current processes; therefore, the aggregate HAP emissions would not exceed the 25 tpy threshold.

Except for the 2-mile radius around three power plants which are nonattainment for SO₂, the entire Island of Guam is in attainment or unclassified for all criteria pollutants. Andersen AFB is outside the 2-mile radius for each of the three power plants. As indicated in Table 4.3-1, the additional SO₂ emissions would not exceed PSD thresholds. As mentioned in Subchapter 3.3.1, federal actions occurring in air basins that are in attainment of the NAAQS are not subject to the Conformity Rule, and a Conformity Determination would not be required.

Radon

Testing would be accomplished at each site where an enclosed structure would be constructed prior to initiation of the facility design process if it is expected that radon occurs at the site. Should radon be detected, the new facilities would be constructed with radon-resistant techniques that would keep indoor radon levels below the action level (4 pCi/L) (USAF 1998). There are five major parts to a passive radon-resistant system:

- A layer of gas-permeable material under the foundation (usually 4 inches of gravel);
- Plastic sheathing over that material;
- Sealing and caulking of all openings in the concrete foundation floor;
- Installation of a gas-tight 3-or 4-inch vent pipe that runs from under the foundation through the building to the roof; and
- A roughed-in electrical junction box for future installation of a fan, if needed (USEPA 1998b).

These features create a physical barrier to radon entry. The vent pipe redirects the flow of air under the foundation, preventing radon from seeping into the building. As stated in Subchapter 3.3.4, radon is not an outdoor problem.

4.3.2 Alternative B

The number of aircraft operations would increase under Alternative B when compared to baseline. Additionally, facility construction, addition, and alteration projects would be accomplished to support the alternative. Facility construction projects would begin in FY07 and occur over an approximate 16-year period. The on-Base population would increase by 1,850 personnel. The methods used to calculate emissions for Alternative A were used to determine Alternative B emissions. Table 4.3-2 details the average annual emissions for Alternative B.

Table 4.3-2 Alternative B Air Emissions

Criteria Air Pollutant	CO (tpy)	VOC (tpy)	NO _x (tpy)	SO _x (tpy)	PM ₁₀ (tpy)
Total No Action Alternative Emissions	433.6	201.8	299.6	36.9	134
Alternative B Emissions					
Short Term Emissions					
Construction/Demolition	4.8	0.8	8.0	0.9	2.7
Full ISR/Strike Capability Recurring Emissions					
Aircraft Emissions	30.4	7.8	13.0	2.2	4.2
POV Emissions	34.9	2.5	4.0	0.4	25.1
Fuel Cell Maintenance Emissions	0.0	0.3	0.0	0.0	0.0
Corrosion Control Emissions	0.0	0.4	0.0	0.0	0.3
Total Recurring Alternative B Emissions	65.3	11.0	17.0	2.6	29.6
PSD "Significant" Levels*					
	250	250	250	250	250

* Guam Regulations 1105

Note: VOC is not a criteria air pollutant. However, VOC is reported because, as an ozone precursor, it is a controlled pollutant

Construction emissions presented in Table 4.3-2 include the estimated annual emissions from construction equipment exhaust, paving operations, and dust from ground-disturbing activities associated with Alternative B. It is estimated the construction, demolition, renovation, and paving activity would last about 16 years and that ground-disturbing activities would occur for about half of the project duration. Construction emissions would produce slightly elevated air pollutant concentrations. However, the effects would be temporary, fall off rapidly with distance from the proposed construction site, and would not result in any long-term impacts. None of the short term emissions associated with Alternative B exceed any "significant" PSD levels.

Review of data in Table 4.3-2 for Andersen AFB indicates that emissions from full ISR/Strike capability recurring activities (e.g., aircraft, AGE, and POV operations) would cause an increase in the criteria pollutants when compared to the No Action Alternative. The greatest portion of the recurring PM₁₀ emissions would be from operations of POVs. None of the full ISR/Strike capability recurring emissions associated with Alternative B would exceed PSD levels.

The Alternative A discussion for HAPs applies to Alternative B. Therefore, the aggregate HAP emissions would not exceed the 25 tpy threshold. Except for the 2-mile radius around three power plants which are nonattainment for SO₂, the entire Island of Guam is in attainment or unclassified for all criteria pollutants. Andersen AFB is outside the 2-mile radius for each of the three power plants. As mentioned in Subchapter 3.3.1, federal actions occurring in air basins

that are in attainment of the NAAQS are not subject to the Conformity Rule, and a Conformity Determination would not be required.

4.3.3 No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established at Andersen AFB. Emissions from aircraft operations, aircraft maintenance, AGE, and POV and GOV vehicle operation, boilers, generators, fueling operations, and industrial processes, would continue to be generated by Andersen AFB. However, there would be an increase in aircraft operations for the No Action Alternative when compared to aircraft operations associated with the baseline. Therefore, the No Action Alternative Emissions consist of 2003 emissions for fuel tanks and fuel facilities, POV, GOV, and stationary source emissions and the emissions from the aircraft operations in Table 2.3-1. The Alternative A discussion for HAPs applies to the No Action Alternative, and the aggregate HAP emissions would not exceed the 25 tpy threshold. Table 4.3-3 shows the updated emissions inventory for the No Action Alternative.

Table 4.3-3 No Action Alternative Air Emissions

Criteria Air Pollutant	CO (tpy)	VOC (tpy)	NOx (tpy)	SOx (tpy)	PM ₁₀ (tpy)
Fuel Tanks ^a	0.0	2.5	0.0	0.0	0.0
Fuel Facilities ^a	0.0	23.0	0.0	0.0	0.0
POV ^a	111.2	8.0	12.8	1.2	80.1
GOV ^a	28.4	3.4	9.1	0.7	8.6
Stationary Sources ^a	27.0	11.1	122.1	14.4	6.9
Aircraft ^b	261	152	134	18	37
AGE ^b	6.0	1.8	21.6	2.6	1.4
Total No Action Alternative Emissions	433.6	201.8	299.6	36.9	134

^a USAF 2005c.

^b Emissions calculated based on 2004 aircraft data

Note: VOC is not a criteria air pollutant. However, VOC is reported because, as an ozone precursor, it is a controlled pollutant

4.3.4 Mitigation

There are no air quality impacts from either Alternative A or Alternative B that require mitigation.

4.3.5 Cumulative Impacts

Alternative A

As with Alternative A, facility construction, addition, and alteration projects would be accomplished under the other actions. However, none of the other actions include aircraft operations. The cumulative on-Base population would increase by 4,248 personnel. The methods used to calculate Alternative A air emissions were used to determine the cumulative emissions for Alternative A and the other actions. Table 4.3-4 presents the cumulative emissions from Alternative A and other action projects and activities.

Table 4.3-4 Alternative A Cumulative Air Emissions

Criteria Air Pollutant	CO (tpy)	VOC (tpy)	NOx (tpy)	SOx (tpy)	PM10 (tpy)
Total No Action Alternative Emissions	433.6	201.8	299.6	36.9	134
Cumulative Emissions					
Short Term Emissions					
Alternative A Construction/Demolition Emissions	5.8	1.2	13.2	1.4	3.9
Other Actions Construction/Demolition Emissions	2.5	0.5	5.6	0.6	4.1
Total Short Term Emissions	8.3	1.7	18.8	2.0	8.0
Recurring Emissions					
Alternative A Recurring Emissions (POV, aircraft, etc.)	88.8	13.0	25.6	3.7	45.7
Other Actions POV Emissions	23.5	1.7	2.7	0.3	16.9
Total Recurring Emissions	112.3	14.7	28.3	4.0	62.6
PSD "Significant" Levels*					
	250	250	250	250	250

* Guam Regulations 1105

Note: VOC is not a criteria air pollutant. However, VOC is reported because, as an ozone precursor, it is a controlled pollutant

Construction emissions presented in Table 4.3-4 include the estimated cumulative annual emissions from construction equipment exhaust, paving operations, and dust from ground disturbing activities. It is estimated the construction, demolition, renovation, and paving activity would last about 16 years and that ground-disturbing activities would occur for about half of the project duration. Construction emissions would produce slightly elevated air pollutant concentrations. However, the effects would be temporary, fall off rapidly with distance from the proposed construction site, and would not result in any long-term impacts.

Review of data in Table 4.3-4 for Andersen AFB indicates that cumulative emissions from recurring activities (e.g., aircraft, AGE, and POV operations) after FY19 would cause an increase in the criteria pollutants when compared to the No Action Alternative. However, none of the recurring emissions would exceed PSD levels.

The Alternative A discussion for HAPs applies to the Alternative A cumulative impacts analysis. The aggregate HAP emissions would not exceed the 25 tpy threshold. Except for the 2-mile radius around three power plants which are nonattainment for SO₂, the entire Island of Guam is in attainment or unclassified for all criteria pollutants. Andersen AFB is outside of the 2-mile radius for each of the three power plants. As mentioned in Subchapter 3.3.1, federal actions occurring in air basins that are in attainment of the NAAQS are not subject to the Conformity Rule, and a Conformity Determination would not be required.

Alternative B

As with Alternative B, facility construction, addition, and alteration projects would be accomplished under the other actions. None of the other actions include aircraft operations. The on-Base population would increase by 3,098 personnel. The methods used to calculate Alternative A cumulative air emissions were used to determine the cumulative emissions from Alternative B and the other actions. Table 4.3-5 presents the cumulative emissions from Alternative B and other action projects and activities.

Table 4.3-5 Alternative B Cumulative Air Emissions

Criteria Air Pollutant	CO (tpy)	VOC (tpy)	NOx (tpy)	SOx (tpy)	PM10 (tpy)
Total No Action Alternative Emissions	433.6	201.8	299.6	36.9	134
Cumulative Emissions					
Short Term Emissions					
Alternative B Construction/Demolition Emissions	4.8	0.8	8.0	0.9	2.7
Other Actions Construction/Demolition Emissions	2.5	0.5	5.6	0.6	4.1
Total Short Term Emissions	7.3	1.3	13.6	1.5	6.8
Recurring Emissions					
Alternative B Recurring Emissions	65.3	11.0	17.0	2.6	29.6
Other Actions POV Emissions	23.5	1.7	2.7	0.3	16.9
Total Recurring Emissions	88.8	12.7	19.7	2.9	46.5
PSD "Significant" Levels*					
	250	250	250	250	250

* Guam Regulations 1105

Note: VOC is not a criteria air pollutant. However, VOC is reported because, as an ozone precursor, it is a controlled pollutant

Construction emissions presented in Table 4.3-5 include the estimated cumulative annual emissions from construction equipment exhaust, paving operations, and dust from ground-disturbing activities. It is estimated the construction, demolition, renovation, and paving activity would last about 16 years and that ground-disturbing activities would occur for about half of the project duration. Construction emissions would produce slightly elevated air pollutant concentrations. However, the effects would be temporary, fall off rapidly with distance from the proposed construction site, and would not result in any long-term impacts.

Review of data in Table 4.3-5 for Andersen AFB indicates that cumulative emissions from recurring activities (e.g., aircraft, AGE, and POV operations) after FY19 would cause an increase in the criteria pollutants when compared to the No Action Alternative. However, none of the recurring emissions would exceed PSD levels.

The Alternative A discussion for HAPs applies to the Alternative B cumulative impacts analysis. The aggregate HAP emissions would not exceed the 25 tpy threshold. Except for the 2-mile radius around three power plants which are nonattainment for SO₂, the entire Island of

Guam is in attainment or unclassified for all criteria pollutants. Andersen AFB is outside of the 2-mile radius for each of the three power plants. As mentioned in Subchapter 3.3.1, federal actions occurring in air basins that are in attainment of the NAAQS are not subject to the Conformity Rule, and a Conformity Determination would not be required.

4.4 INFRASTRUCTURE AND UTILITIES

Effects on infrastructure and utilities were evaluated using the following criteria:

- The extent, if any, that the action would cause changes in consumption, generation, and usage; and
- The extent, if any, that the action would cause changes in demand to the existing system.

Subchapter 4.10, Socioeconomics Resources, identifies the possibility of skilled U.S. workers temporarily relocating to Guam to work on ISR/Strike projects. Housing for these workers could potentially be provided by a combination of:

- The current private housing inventory on Guam;
- Existing hotel properties through several potential processes: conversion to long term lodging by using existing hotels; acceptance of long term rental occupants by existing hotels; and renovating and reoccupying currently vacant hotel properties; and
- Construction and/or upgrade of one or more temporary housing facilities established and operated by construction contracting companies for the sole use of the temporary construction workers.

The loads and impacts on infrastructure for the first two types of housing (*i.e.*, current private housing inventory and existing hotel properties) were addressed when these units were planned, designed, and permitted.

Temporary housing facilities dedicated to construction workers could have a varying level of impact on existing utilities. Use of existing temporary housing facilities would be advantageous because the infrastructure (*i.e.*, roads, wastewater, and water) would be in place. Use of these utilities may increase the load on existing infrastructure and such an increase would require evaluation of specific sites and existing utility systems. New temporary housing facilities would require the normal evaluation for siting, access and infrastructure, and approval and permitting by GovGuam agencies. The optimal sites for temporary housing would likely be those that could use existing utility systems that have verifiable existing utility capacities. Potential sites and the existing conditions vary greatly, and would require evaluation should they be used for temporary housing.

4.4.1 Alternative A

4.4.1.1 Water Supply

As mentioned in Subchapter 2.2.1, aircraft wash racks and clear water rinse facilities would be constructed, and the on-Base population would increase by a total of 3,000 personnel. Table 4.4-1 summarizes the water consumption from aircraft wash rack and clear water rinse facility operations. Table 4.4-2 presents the water use for Alternative A. As indicated in Table 4.4-2, Base water consumption would be 51 percent greater than the No Action Alternative

consumption. The 0.89 mgd of water consumption would equate to 20 percent of the new water supply system.

Table 4.4-1 Water Consumption for Aircraft Wash Racks and Clear Water Rinse Facility

Aircraft Type	Number of Aircraft Washed/Rinsed per Year	Gallons of Water per Aircraft Wash/Rinse	Annual Gallons of Water
Aircraft Wash Racks			
F-22	115	250	28,750
F-15E	29	250	7,250
KC-135	18	500	9,000
Global Hawk	36	250	9,000
B-1	36	2,000	72,000
B-2	12	2,000	24,000
B-52	18	2,000	36,000
subtotal	264	--	186,000
Clear Water Rinse Facility			
F-22	230	1,000	230,000
F-15E	58	1,000	58,000
KC-135	36	1,000	36,000
RQ-4	72	1,000	72,000
B-1	72	1,000	72,000
B-2	24	1,000	24,000
B-52	36	1,000	36,000
subtotal	528	--	528,000
total	--	--	714,000
Total (mgd)			0.002

mgd=million gallons per day

Table 4.4-2 Alternative A Water Supply Analysis

Line	Condition	Volume	Value
1	Additional personnel	3,000	personnel
2	Per capita consumption	100	gallons per person per day
3	Consumption for additional Alternative A personnel	300,000	gallons per day
4	Consumption for additional Alternative A personnel (line 3)	0.30	mgd
5	Aircraft washing/rinsing consumption	0.002	mgd
6	Baseline personnel consumption (i.e., excluding water associated with system loss)	0.59	mgd
7	Alternative A water consumption (lines 4+5+6)	0.892	mgd
8	Alternative A consumption compared to No Action Alternative (line 7/line 6)	+51	%
9	System capacity	4.5	mgd
10	Alternative A consumption as % of system capacity (line 7/line 9)	20	%

To comply with EO 13123, newly constructed buildings would have low-flow water saving devices (toilets, shower heads, and faucets) installed. Common low-volume appliances include the 1.6 gallons-per-flush toilets (uses 54 percent less water), 2.2 gallons per minute (gpm) faucet aerators, 2.5 gpm showerheads, and front-loading washing machines (uses 40 percent less water per load). It is estimated that the use of water saving devices reduces indoor consumption by as much as 39 percent (TWRI 2002).

The Base has a significant supply of high quality water which can be utilized to absorb the proposed mission. However, to meet an increased demand the Base would have to upgrade its water system to meet the worst-case fire demand. The installation is meeting all of its current water demands. As stated in Subchapter 3.4.1, the Base has taken steps to correct the capacity problems with a \$15.0M project that would construct a new well field in Northwest Field. In addition, a 3.0 million gallon ground level storage tank and booster station would be constructed on the main base to provide storage and convey water to the Base distribution system. Calculations for additional capacity, assuming the Base takes advantage of all storage available as well as the two additional water connections available, indicate that a resource opportunity of 8.3 mgd exists, which could support 61,556 people at a consumption rate of 135 gallons/person/day (Andersen AFB 2005c).

4.4.1.2 Wastewater Treatment

As mentioned in Subchapter 2.2.1, aircraft wash racks and clear water rinse facilities would be constructed and the on-Base population would increase by a total of 3,000 personnel. Water used at rinse facilities would be discharged to the WWTP. Table 4.4-3 presents the wastewater generation for Alternative A. As indicated in the table, wastewater generation would be 74 percent greater than the No Action Alternative generation. The total wastewater discharge at the WWTP when combining the Base's wastewater and the existing flow would be 9.9 mgd, or about 82 percent of the plant design capacity. The service contract under which contractors pump out existing Base grease traps and oil/water separators would be expanded to include those

oil/water separators that would be added as a result of the new facilities. Surface water discharges of water from the oil/water separators would not be allowed. All new wastewater systems are evaluated to determine if necessary, what size and type of treatment would be required before wastewater is sent to the sewer system. Evaluations and upgrades to the existing sewer system are in process to accommodate new construction. All wastewater systems upgrades and individual wastewater disposal systems would comply with Guam EPA wastewater regulations. The Base will continue negotiating with the GWA to determine the amount of wastewater the Base will be allowed to send to the Northern District WWTP. Base personnel would continue to monitor waste water flow rates on a monthly basis at the Base's final lift station.

Table 4.4-3 Alternative A Wastewater Analysis

Line	Condition	Volume	Value
1	Additional personnel	3,000	personnel
2	Per capita generation	35	gallons per person per day
3	Generation for additional Alternative A personnel	105,000	gallons per day
4	Generation for additional Alternative A personnel (line 3)	0.105	mgd
5	Aircraft washing/rinsing generation	0.002	mgd
6	Additional industrial generation	0.055	mgd
7	Baseline generation	0.220	mgd
8	Alternative A generation (lines 4+5+6+7)	0.382	mgd
9	Alternative A generation compared to No Action Alternative (line 8/line 7)	+74	%
10	Average daily WWTP flow	9.5	mgd
11	Projected WWTP flow (line 8+line 10)	9.9	mgd
12	WWTP design capacity	12.0	mgd
13	Alternative A generation as % of WWTP design capacity (line 11/line 12)	82	%

Note: Design of the wash racks and clear water rinse facility indicate wastewater from the facilities would be discharged to the wastewater collection system. Therefore, the volume of water that would be used at the facilities (see Table 4.4-1) would be discharged to the wastewater collection system.

Draft EIS Comment: The Final EIS should also include a review of GWA's draft Water Resources Master Plan for compatibility. These discussions should include the impact the increase wastewater flow will have on GWA's 301(h) permit renewal and whether upgrades to secondary wastewater treatment will be needed.

Response: The analysis in the FEIS was improved and modified by considering and further analyzing the issues in this comment by expanding the second paragraph of Subchapter 4.4.1.2 to include data from the draft Water Resources Master Plan and GWA's 301(h) permit.

Alternative A would increase wastewater treatment at the plant to 82 percent of capacity. The current waiver application from secondary wastewater treatment requirements under Section 301(h) of the Clean Water Act does not include an increase in flow from Andersen AFB. Therefore, GWA would submit a new permit application for renewal of its permit under the proposed project. Andersen AFB would coordinate with GWA the amount of Base wastewater that would be allowed for treatment at the WWTP. Plans must be approved between the Air Force and GWA to share in the up-grade and maintenance costs of sewer distribution and treatment.

Andersen AFB currently has sufficient wastewater discharge capacity to meet its current demand and sufficient capacity for expansion. If the

USEPA imposes stricter discharge limitations on the GWA wastewater treatment plant and, as a result GWA imposes restrictions on its dischargers, the Base may be required to implement pre-treatment technology to meet its effluent concentration limits. In addition, the Base would increase its management oversight of the wastewater program (Andersen AFB 2005c).

4.4.1.3 Energy and Communications

Energy

Under Alternative A, building space would increase by 1,918,089 ft². Based on the baseline consumption of 0.0027 kWh per square foot per day and the increase in space, Alternative A would increase usage by 5,179 kWh per day. This would equate to an approximate 27.4 percent increase when compared to the average daily No Action Alternative electrical consumption of 18,913 kWh per day and 0.94 percent of the GPA generation capacity. The Andersen AFB electricity use resulting from Alternative A and the existing condition would be 24,092 kWh, which equates to 4.4 percent of the GPA generation capacity. The GPA's power plant 100 percent generation capacity reserve (USAF 2004c) would accommodate the increase in electrical consumption. Repair of the Base distribution as described in Subchapter 3.3 and installation of another 20 MW substation as planned for the ISR/Strike capability would ensure the additional generation could be distributed on the Base.

Where practicable, facilities would be constructed in an energy-efficient and sustainable manner as discussed in Subchapter 2.2.1.1.

Communications

According to a systems assessment conducted in June 2004, there are no significant problems or capacity issues with the current Base communications system. However, to accomplish missions in the future and accommodate mission growth, the Base should continue to implement communications system expansions and improvements (USAF 2004c).

4.4.1.4 Storm Water Management

Alternative A would construct a total of 4,733,634 ft² (108.7 acres) of buildings, new pavements, and other improvements, which represent an increase in impervious cover of 18.8 percent when compared to the No Action Alternative. All proposed demolition and construction activities would occur within the boundaries of Andersen AFB. There are no perennial or intermittent streams on the Base and no developed drainage infrastructure. Runoff is slow and the hazard of water erosion is slight (Andersen AFB 2000). The existing drainage basins within Andersen AFB and the current storm water management systems would accommodate the increase in run off due to the additional impervious cover. Upgrades to UIC stormwater systems (to include new UIC wells) to accommodate the increase in runoff would be accomplished for construction projects such as runways and other impervious surfaces that are susceptible to petroleum leaks and spills. New designs that incorporate devices to increase ponding and retention (pre-treatment for the initial portion of the storm event) would be implemented. New oil/water separator systems would also be required.

Draft EIS Comment: Upgrades to stormwater systems will be required to accommodate any additional increases to the capacity of the system.

Response: The FEIS was improved as suggested by the commenter by revising Subchapter 4.4.1.4 of the EIS with the information in the comment.

Based on current location plans for facility sites 1, 4, and 35 on Figure 2.2-4, three of the 103 dry wells on the Base could be lost. The loss of the three wells should not present a problem because there are other nearby wells that are currently under capacity. These nearby wells could accommodate the flow that goes to the three wells that might be lost as a result of construction. Some terrain design work may be necessary to channel water from the area of the three wells to the nearby, under-capacity wells (Clark 2005). The Base would continue to monitor 12 of the wells twice a year during and after construction to ensure that water entering the wells meets drinking water standards. As required by Guam EPA, all stormwater would be addressed on-site whenever possible.

Construction contractors would ensure an EPP is prepared, provided to Andersen AFB for submittal to Guam EPA, and approved before initiating activities. The EPP would likely include complying with erosion control techniques that would be used during demolition and construction to minimize erosion. The construction sites would have silt fences and other erosion control features down gradient, such as absorbent booms for oil and grease. Hay bales or other absorbent materials would be installed around storm drainage system inlets to prevent sediment or other contaminants from entering the storm water system (to include the dry wells that utilize the karst features to migrate stormwater to the aquifer) during the project. The rate of runoff from the construction site would be retarded and controlled mechanically. Diversion ditches would be constructed to retard and divert runoff to protected drainage courses. If site characteristics present the potential for storm water sediment to enter the storm water system, drains in the area would be protected with silt fences, hay bales, or an approved equivalent.

4.4.1.5 Solid Waste Management

Solid waste would be generated from implementation of Alternative A. This waste would consist of building debris and construction materials such as concrete, asphalt, metals (roofing, reinforcement bars, conduit, piping, *etc.*), fiberglass (roofing materials and insulation), cardboard, plastics (PVC piping, packaging material, shrink wrap, *etc.*), and lumber. Solid waste would also be generated by residential and daily mission activities. Analysis of the impacts associated with Alternative A is based on the following assumptions:

- Approximately 4 pounds of construction debris are generated for each square foot of floor area for new structures (Davis 1995);
- Approximately 92 pounds of demolition debris are generated for each square foot of floor area of demolished structures (U.S. Army Corps of Engineers [USACE] 1976);
- Approximately 1 pound of construction debris is generated for each square foot of new asphaltic concrete pavement; and
- Debris would be disposed 6 days per week (312 days per year) over the 16-year project.

Under Alternative A, there would be an additional 3,000 personnel working and residing on Base. Thus, approximately 7,500 additional pounds per day (3.75 tpd) of solid waste would be generated above the No Action Alternative by mission and residential activities when considering the increase in personnel and the baseline generation rate of 2.5 lbs per person per day, excluding the amount of household recycling materials. Combining the 3.75 tpd with the baseline 7.4 tpd results in 11.15 tpd of solid waste (3,479 tpy) being disposed in a landfill

312 days per year. The increase in disposal equates to 51 percent above the No Action Alternative rate.

It is estimated the landfill would reach 100 percent capacity by December 2007, regardless of Alternative A activities. A study is currently being conducted to investigate the possibility of vertically extending the current landfill for use beyond 2009. The study is scheduled for completion in January 2007. Thus, Andersen AFB plans to use the expanded on-Base landfill until 2009 or later if the current study supports expansion, and then use a permitted landfill. Although it is not known at this time which landfill would be used, there are three possible options: (1) the proposed GovGuam landfill after it becomes available in 2009-2010; (2) the on-Base landfill that would be constructed as an ISR/Strike project; and (3) the Navy landfill. Planning for the GovGuam and ISR/Strike landfills has not progressed to the point where the capacities or life spans are known. Therefore, quantitative analysis of the impact of the ISR/Strike project on the landfill cannot be accomplished.

Andersen AFB would submit the permit application for Guam EPA coordination to ensure the landfill expansion project is not delayed. Likewise, the Base would submit the permit application for Guam EPA coordination for the ISR/Strike landfill project. A permitting concern is whether Guam EPA would approve and issue a permit because the landfill project would be located over a Sole Source Aquifer. Characteristics of the leachate from the proposed landfill would not change from that for the existing landfill because the current and future waste streams would be the same. Recent monitoring results of the leachate effluent from the existing landfill do not show contaminate levels above required standards, and BOD₅ levels were very low. Additionally, monitoring wells located down gradient of the landfill are sampled to ensure that leachate is not migrating into the aquifer (Sherrill 2006b). The ISR/Strike landfill project would be designed and constructed with environmental controls to prevent contamination of the aquifer.

All green waste would continue to be segregated and collected for mulching, chipping, and composting or burned in small piles on site after obtaining a burning permit from the local fire department. Additionally, Andersen AFB would continue its aggressive pollution prevention and recycling program to divert solid waste.

Based on information in Subchapter 2.2.1.1, 5,116,059 ft² of structures would be constructed, 228,769 ft² would be demolished, 112,500 ft² would be renovated, and 3,081,701 ft² of new pavement would be constructed under Alternative A. Based on these data and the assumptions listed above, it is estimated that 27,700 tons of construction and demolition debris would be generated by Alternative A. Approximately 5.6 percent of this amount would be due to concrete or asphalt paving projects (*e.g.*, realign Arc Light Boulevard, taxiway networks, *etc.*).

Any materials that could be recycled or re-used would be diverted from the waste stream to extend the lifespan of the MSW landfill. Contracts issued for construction activities would require the contractor to recycle construction and demolition debris (*e.g.*, concrete, asphalt, scrap metal, roofing, reinforcement bars, conduit, piping, fiberglass, insulation, cardboard, plastics [PVC piping, packaging material, shrink wrap, *etc.*], and lumber) to the maximum extent possible, thereby reducing the amount of construction and demolition debris disposed in the landfill. The exact amount of debris that would be recycled cannot be estimated at this time because the amount that would be recycled is unknown.

Alternatives are available to Andersen AFB in the event the new GovGuam landfill is not permitted in time for implementation of the proposed project. These include incineration (waste-to-energy [WTE]) and a new technology that grinds, shreds, and utilizes pressurized heat to reduce MSW (approximately 95 percent) to “fluff.” The alternatives are further discussed below.

Waste-to-energy solutions are increasingly being considered as a viable cost effective option to conventional landfilling, especially with the relatively recent increase in energy cost. WTE facilities are widely used in Japan and in many European countries. GovGuam considered using an incinerator for the past decade. However, since 1996, GovGuam and Guam Resource and Recovery Partners have been entrenched in court battles over a contract to build a WTE incinerator facility due to concerns about the legality of the contract, as well as the cost and environmental impact of an incinerator. Therefore, the long delays have prompted the USEPA to press through a lawsuit ordering the closure of the Ordot Dump and the siting of a new landfill. Since large scale WTE facilities require significant amounts of MSW generation, Andersen AFB would need to partner with GovGuam and the Navy to create a plant; however, this may not be an attractive option with the potential political and public resistance. Additionally, smaller scale modular WTE facilities could potentially be developed with less controversy and could be an attractive option for the Base. A company in Agat is developing an incinerator to burn garbage from vessels and aircraft arriving on Guam, although its capacity is very small compared to what would be required for Andersen AFB (Andersen AFB 2005c).

The island environment of Guam with its constrained land availability, dependence on water supply through the high water table aquifers, and fairly high population density, indicate that WTE facilities should be considered as an important alternative for waste disposal. WTE facilities alleviate the need for the considerable land mass associated with landfilling while simultaneously providing alternative energy sources generated locally. Private production costs of WTE options are typically more expensive than traditional landfill options. However, with the scarcity (*i.e.*, more valuable) of available land on island environments, landfill production costs can also be considerable (Andersen AFB 2005c).

A company called “WastAway” developed a recycling process that recycles unsorted household garbage. The by-product, fluff, is similar to wood pulp which can be processed into a growing medium or be extruded to make products such as park benches and construction materials (WastAway 2006). The recycled fluff can also be used as a soil amendment and soil substrate growing medium. The U.S. Army was the first to use the new equipment, and tests were held in Fort Campbell, Kentucky, and Fort Benning, Georgia, to validate the system. A number of counties and one corporation recently purchased a WastAway facility and began processing their MSW into fluff (Andersen AFB 2005c).

4.4.1.6 Transportation

Short-term traffic congestion from the construction and demolition projects would occur in the construction areas. This congestion would be eliminated when the project activity would be completed, thereby minimizing the potential for long-term impacts. Commuting patterns of workers and residents would change as some of the roads undergo construction; however, alternative roads and arteries within the Base could be used to access the area. Additionally, most of the heavier traffic from construction activities would occur in less congested areas of the

Base. Some roads near construction sites could also be closed at various times throughout the project due to demolition and construction activities. Efforts would be taken to keep construction related traffic off the roads by re-directing it to other areas of the installation. Additionally, a construction and parking management plan would be developed that minimizes traffic interference and maintains traffic flow.

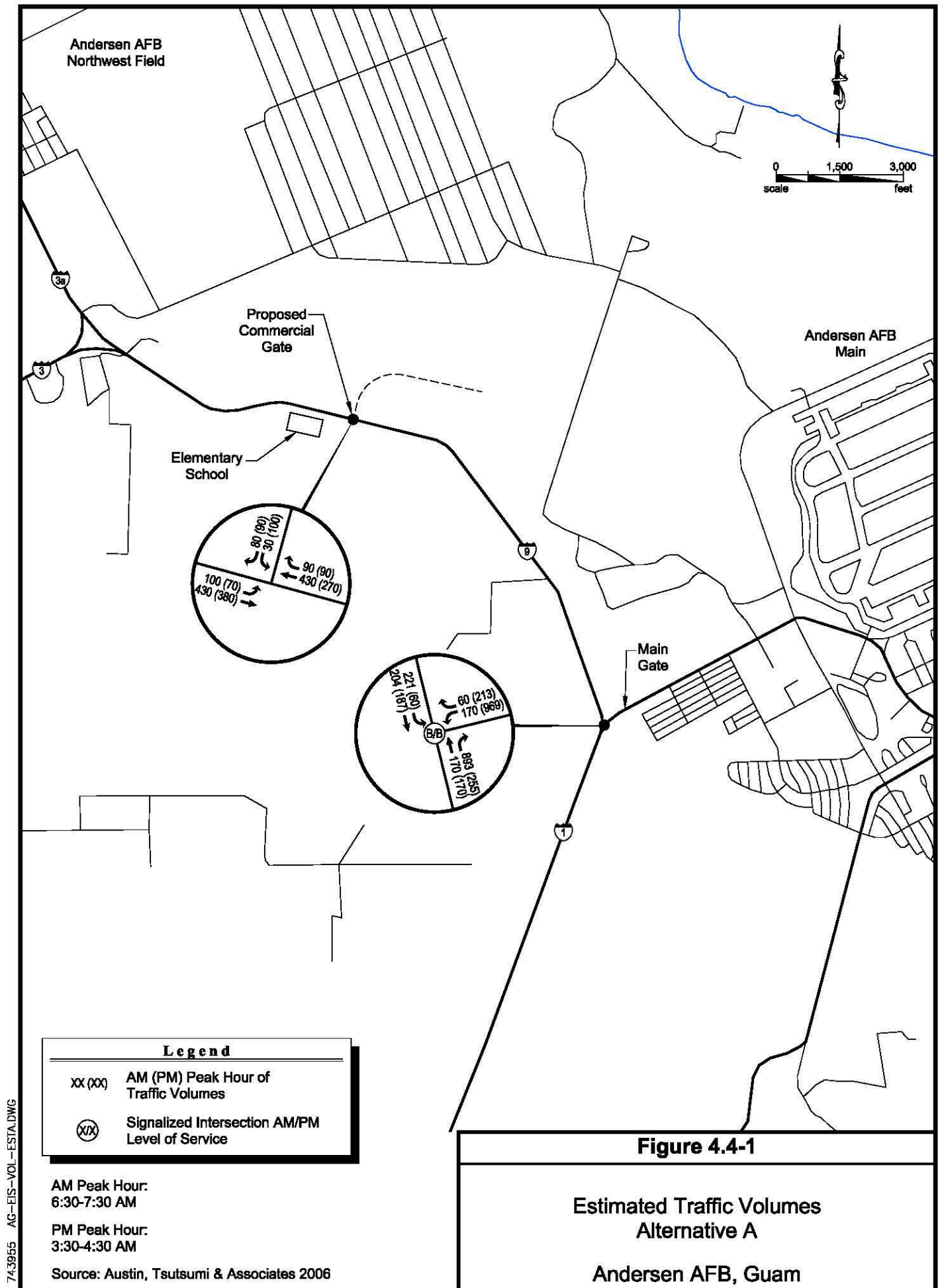
The traffic study completed for the Commercial Gate project estimated that vehicle volumes would double (Austin, Tsutsumi & Associates 2006) when considering the ISR/Strike Alternative A and other projects. Figure 4.4-1 presents the estimated traffic volumes at the intersections of Arc Light Boulevard and Highway 1 and Route 9 and the Commercial Gate for the morning (6:30-7:30 a.m.) and afternoon (3:30-4:30 p.m.) peak hours of traffic for Alternative A. The estimated levels of traffic are prorated on the assumption that the doubling of traffic applies to the condition that would result from the combination of the ISR/Strike project and the other actions identified in Subchapter 2.4. Adding the 3,000 additional persons associated with Alternative A to the current base population would equate to 85 percent of the doubled condition estimated by Austin, Tsutsumi & Associates 2006. Therefore, the traffic estimates for the Arc Light Boulevard intersection with Highway 1 and Route 9 on Figure 4.4-1 reflect 85 percent of the doubled baseline data for the intersection (see Figure 3.4-1). Data for the intersection of Route 9 and the Commercial Gate reflect 10 vehicles per hour for an 8-hour work day (Austin, Tsutsumi & Associates 2006).

Based on the volume data depicted on Figure 4.4-1 for the intersection of Arc Light Boulevard and Highway 1 and Route 9, and the LOS definitions in Subchapter 3.4.6, it is estimated that the LOS for the intersection would be LOS C or better during the peak hours of traffic. The baseline condition for the intersection is LOS B. At LOS C most experienced drivers are comfortable, roads remain safely below but efficiently near capacity, and posted speed is maintained. The 2006 traffic study found that a traffic signal is not warranted for the intersection of the Commercial Gate and Route 9 and the intersection would operate at LOS B or better (Austin, Tsutsumi & Associates 2006).

4.4.2 Alternative B

4.4.2.1 Water Supply

As mentioned in Subchapter 2.2.1, aircraft wash racks and clear water rinse facilities would be constructed and the on-Base population would increase by a total of 1,850 personnel. The number of aircraft under Alternative B would be the same as Alternative A. Therefore, the water consumption for aircraft washing and the clear water rinse facility under Alternative B would be the same as Alternative A (see Table 4.4-1). Table 4.4-4 presents the water use for Alternative B. As indicated in the table, water consumption would be 32 percent greater than the No Action Alternative consumption. The 0.777 mgd of water consumption would equate to 17.3 percent of the new water supply system. The discussion and analysis for water conservation measures, fire demand, water quality, and water storage in Alternative A apply.



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Table 4.4-4 Alternative B Water Supply Analysis

Line	Condition	Volume	Value
1	Additional personnel	1,850	personnel
2	Per capita consumption	100	gallons per person per day
3	Consumption for additional Alternative B personnel	185,000	gallons per day
4	Consumption for additional Alternative B personnel (line 3)	0.185	mgd
5	Aircraft washing/rinsing consumption	0.002	mgd
6	Baseline personnel consumption (i.e., excluding water associated with system loss)	0.59	mgd
7	Alternative B water consumption (lines 4+5+6)	0.777	mgd
8	Alternative B consumption compared to No Action Alternative (line 7/line 6)	+32	%
9	System capacity	4.5	mgd
10	Alternative B consumption as % of system capacity (line 7/line 9)	17.3	%

4.4.2.2 Wastewater Treatment

As mentioned in Subchapter 2.2.1, aircraft wash racks and clear water rinse facilities would be constructed and the on-Base population would increase by a total of 1,850 personnel. Water used at rinse facilities would be discharged to the WWTP. Table 4.4-5 presents the wastewater generation for Alternative B. As indicated in the table, wastewater generation would be 55 percent greater than the No Action Alternative generation. The total wastewater discharge at the WWTP when combining the Base's wastewater and the existing flow would be 9.841 mgd, or about 82 percent of the plant design capacity. The service contract, surface water discharge, wastewater system evaluation, wastewater disposal upgrades, MOU, Section 301(h) of the Clean Water Act, wastewater pre-treatment, and wastewater flow monitoring discussion for Alternative A apply.

4.4.2.3 Energy and Communications

Energy

Under Alternative B, building space would increase by 1,452,940 ft². Based on the baseline consumption of 0.0027 kWh per square foot per day and the increase in space, Alternative B would increase usage by 3,923 kWh per day. This would equate to an approximate 20.7 percent increase when compared to the average daily No Action Alternative electrical consumption of 18,913 kWh per day and 0.71 percent of the GPA generation capacity. The Andersen AFB electricity use resulting from Alternative B and the existing condition would be 22,836 kWh, which equates to 4.1 percent of the GPA generation capacity. The GPA's power plant 100 percent generation capacity reserve (USAF 2004c) would accommodate the increase in electrical consumption. Repair of the Base distribution as described in Subchapter 3.3 and installation of another 20 MW substation as planned for the ISR/Strike capability would ensure the additional generation could be distributed on the Base.

Where practicable, facilities would be constructed in an energy-efficient and sustainable manner as discussed in Subchapter 2.2.1.1.

Table 4.4-5 Alternative B Wastewater Analysis

Line	Condition	Volume	Value
1	Additional personnel	1,850	personnel
2	Per capita generation	35	gallons per person per day
3	Generation for additional Alternative B personnel	64,750	gallons per day
4	Generation for additional Alternative B personnel (line 3)	0.065	mgd
5	Aircraft washing/rinsing generation	0.002	mgd
6	Additional industrial generation	0.054	mgd
7	Baseline generation	0.220	mgd
8	Alternative B generation (lines 4+5+6+7)	0.341	mgd
9	Alternative B generation compared to No Action Alternative (line 8/line 7)	+55	%
10	Average daily WWTP flow	9.5	mgd
11	Projected WWTP flow (line 8+line 10)	9.841	mgd
12	WWTP design capacity	12.0	mgd
13	Alternative B generation as % of WWTP design capacity (line 11/line 12)	82	%

Note: Design of the wash racks and clear water rinse facility indicate wastewater from the facilities would be discharged to the wastewater collection system. Therefore, the volume of water that would be used at the facilities (see Table 4.4-5) would be discharged to the wastewater collection system.

Communications

The discussion and analysis for Alternative A apply.

4.4.2.4 Storm Water Management

Alternative B would construct a total of 4,268,485 ft² (98 acres) of buildings, new pavement, and other improvements, which represents an increase in impervious cover of 17 percent when compared to the No Action Alternative. All proposed demolition and construction activities would occur within the boundaries of Andersen AFB. The stormwater system upgrade, pre-treatment, UIC stormwater controls, and EPP discussion and analysis for Alternative A apply to Alternative B.

4.4.2.5 Solid Waste Management

Under Alternative B, the Air Force proposes construction and demolition projects similar to Alternative A. The analysis for the alternative is based on the same assumptions and data used to evaluate Alternative A. Based on information in Subchapter 2.2.2.1 and assumptions listed in this subchapter for solid waste management, solid waste would be generated from implementation of Alternative B.

Under Alternative B, there would be an additional 1,850 personnel working and residing on Base. Thus, approximately 4,625 additional pounds per day (2.3 tpd) of solid waste would be generated above the No Action Alternative by mission and residential activities when considering the increase in personnel and the baseline generation rate of 2.5 pounds per person

per day, excluding the amount of household recycling materials. Combining the 2.3 tpd with the baseline 7.4 tpd results in 9.7 tpd of solid waste (3,026 tpy) being disposed in a landfill 312 days per year. The increase in disposal equates to 31 percent above the No Action Alternative rates.

It is estimated the landfill would reach 100 percent capacity by December 2007, regardless of Alternative B activities. A study is currently being conducted to investigate the possibility of vertically extending the current landfill for use beyond 2009. The study is scheduled for completion in January 2007. Thus, Andersen AFB plans to use the expanded on-Base landfill until 2009 or later if the current study supports expansion, and then use a permitted landfill. Although it is not known at this time which landfill would be used, there are three possible options: (1) the proposed GovGuam landfill after it becomes available in 2009-2010; (2) the on-Base landfill that would be constructed as an ISR/Strike project; and (3) the Navy landfill. Planning for the GovGuam and ISR/Strike landfills has not progressed to the point where the capacities or life spans are known. Therefore, quantitative analysis of the impact of the ISR/Strike project on the landfill cannot be accomplished. The landfill permitting and environmental controls discussion for Alternative A applies.

All green waste would continue to be segregated and collected for mulching, chipping, and composting or burned in small piles on site after obtaining a burning permit from the local fire department. Additionally, Andersen AFB would continue its aggressive pollution prevention and recycling program to divert solid waste.

Based on information in Subchapter 2.2.2.1, 4,650,910 ft² of structures would be constructed, 228,769 ft² would be demolished, 112,500 ft² would be renovated, and 3,081,701 ft² of new pavements would be constructed under Alternative B. Based on these data and the assumptions listed above, it is estimated that 26,766 tons of construction and demolition debris would be generated. Approximately 5.6 percent of this amount is due to concrete or asphalt paving projects (*i.e.*, realign Arc Light Boulevard, taxiway networks, *etc.*). Alternative A construction and demolition debris recycling and WTE technologies discussions and analysis apply to Alternative B.

4.4.2.6 Transportation

Alternative B facilities construction and activities are identical to Alternative A except that family housing units and family housing management facilities would not be constructed under this alternative. The discussion and analysis for on-Base traffic at and around construction sites for Alternative A applies to Alternative B.

The traffic study completed for the Commercial Gate project estimated that vehicle volumes would double (Austin, Tsutsumi & Associates 2006) when considering Alternative B. Figure 4.4-2 presents the estimated traffic volumes at the intersections of Arc Light Boulevard and Highway 1 and Route 9 and the Commercial Gate for the morning (6:30-7:30 a.m.) and afternoon (3:30-4:30 p.m.) peak hours of traffic for Alternative B. The estimated levels of traffic are prorated on the assumption that the doubling of traffic applies to the condition that would result from the combination of the ISR/Strike project and the other actions identified in Subchapter 2.4. Adding the 1,850 additional persons associated with Alternative B to the current base population would equate to 72 percent of the doubled condition estimated by Austin, Tsutsumi & Associates 2006. Therefore, the traffic estimates for the Arc Light Boulevard

intersection with Highway 1 and Route 9 on Figure 4.4-2 reflect 72 percent of the doubled baseline data for the intersection (see Figure 3.4-1). The data for the intersection of Route 9 and the Commercial Gate reflect 10 vehicles per hour for an 8-hour work day (Austin, Tsutsumi & Associates 2006).

Based on the volume data depicted on Figure 4.4-2 for the intersection of Arc Light Boulevard and Highway 1 and Route 9 and the LOS definitions in Subchapter 3.4.6, it is estimated that the LOS for the intersection would be LOS C or better during the peak hours of traffic. The baseline condition for the intersection is LOS B. At LOS C most experienced drivers are comfortable, roads remain safely below but efficiently near capacity, and posted speed is maintained. The 2006 traffic study found that a traffic signal is not warranted for the intersection of the Commercial Gate and Route 9 and the intersection would operate at LOS B or better.

4.4.3 No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established at Andersen AFB. Construction and demolition activities associated with individually programmed facility actions and O&M activities would continue to occur. Although the number of assigned personnel could undergo the minor fluctuations resulting from routine Air Force personnel actions, the number of Air Force personnel at the Base would remain at the September 2004 levels (*i.e.*, approximately 5,900 personnel).

4.4.3.1 Water Supply

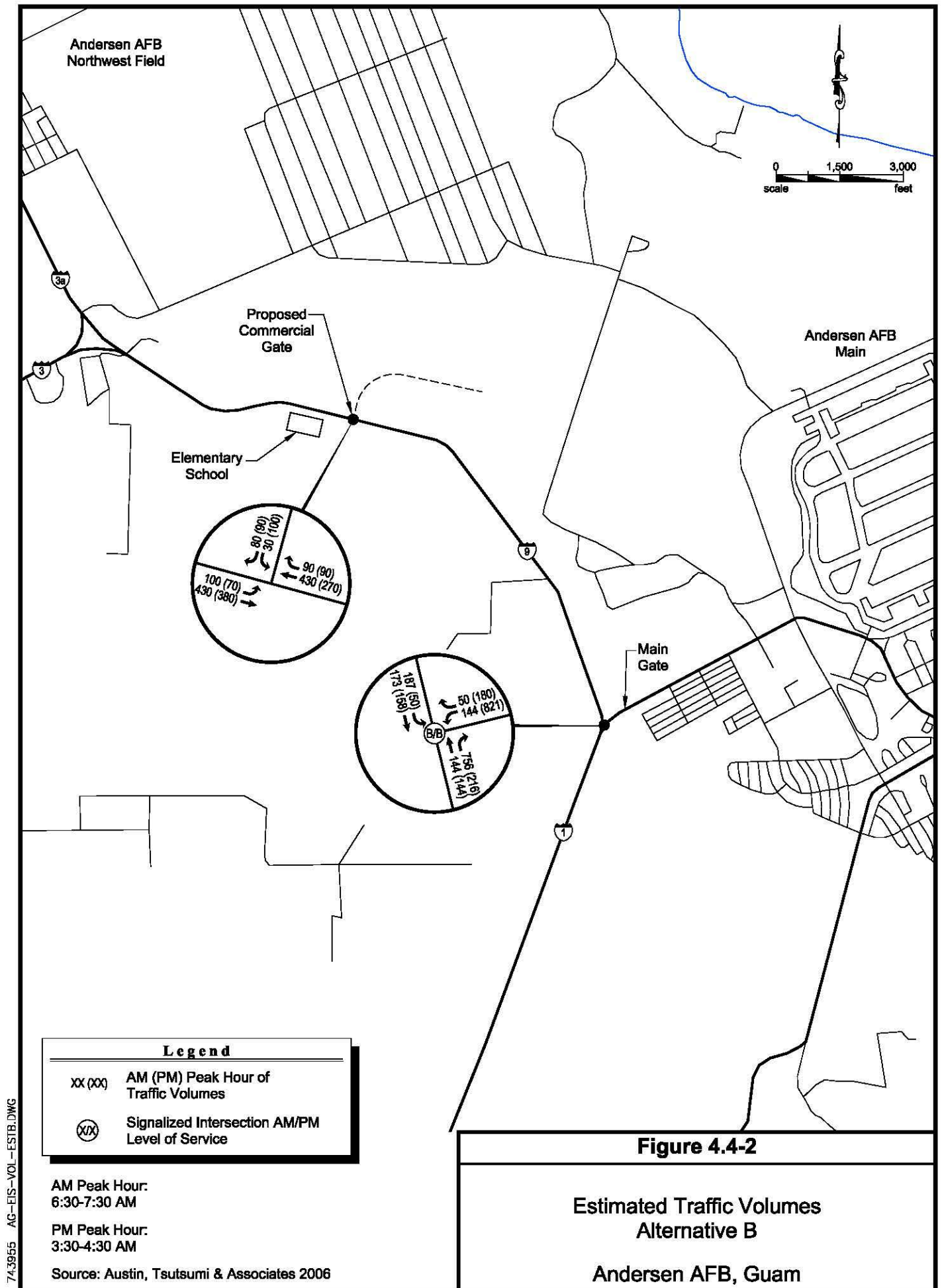
Under the No Action Alternative, water consumption by personnel would continue at 0.59 mgd, which is approximately 13 percent of the system capacity of 4.5 mgd.

4.4.3.2 Wastewater Treatment

Under the No Action Alternative, the Base would continue to generate approximately 0.22 mgd of wastewater that would be treated at the GWA WWTP. The WWTP would continue to operate at 79 percent of the plant design capacity.

As discussed in Subchapter 3.4.2, Andersen AFB has experienced two overflow conditions in the wastewater collection system due to typhoons. GPA-funded overflow studies and other infrastructure improvements to the WWTP, pump station, and upgrades to sanitary sewers in the Northern District WWTP system would eliminate surcharges and increase system reliability. Planned improvements and repairs, including completion of the ocean outfall, should bring the WWTP back into compliance with the USEPA. Base personnel would continue to monitor waste water flow rates on a daily basis at the base's final lift station.

Andersen AFB has no concentration limitations on its wastewater discharge that is sent to the GWA WWTP. However, the GWA plant does have an NPDES permit for specific constituents. If the NPDES permit for the GWA plant is revised, it is likely that GWA would impose contaminant concentration limits on the Base.



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4.4.3.3 Energy and Communication

Energy

Andersen AFB would continue to be serviced by the GPA and the Base would continue to consume electricity at the rate of 20 MW (Ostil 2006a), which equates to 3.6 percent of the GPA generation capacity. The electrical distribution system shortcomings identified in Subchapter 3.4.3 would continue.

Communications

Under the No Action Alternative, the existing Base communications system would continue to meet the immediate needs of the Base even as it implements the CITS which began in June 2004. The CITS is upgrading some network infrastructure both underground and inside buildings at the Base. These improvements would increase both capacity and reliability.

4.4.3.4 Storm Water Management

Under the No Action Alternative, storm water management and runoff would continue as described for the current conditions. Over 100 dry wells are installed to assist in storm water migration into the aquifer. The total disposal capacity of the wells is approximately 548 mgd. The base would continue to monitor 12 of the wells twice a year to ensure that water entering the wells meets drinking water standards. Upgrades to stormwater systems would be required for on-going military construction (MILCON) construction projects. New facilities that have washracks would have oil/water separator systems. Discussions of required pre-treatment of stormwater and stricter discharge limitations in Subchapter 4.4.1.3 apply.

4.4.3.5 Solid Waste Management

Under the No Action Alternative, it is estimated the landfill would reach 100 percent capacity by December 2007. A study is currently being conducted to investigate the possibility of vertically extending the current landfill for use beyond 2009. The study is scheduled for completion in January 2007. Thus, Andersen AFB plans to use the expanded on-Base landfill until 2009 or later if the current study supports expansion, and then use a permitted landfill. Although it is not known at this time which landfill would be used, there are two possible options: (1) the proposed GovGuam landfill after it becomes available in 2009-2010; and (2) the Navy landfill. Planning for the GovGuam landfill has not progressed to the point where the capacities or life span is known. Therefore, quantitative analysis of the impact of the No Action Alternative on the landfill cannot be accomplished. MSW disposal would continue at the current rate of 23.1 tpd. All green waste would continue to be segregated and collected for mulching, chipping, and composting or burned in small piles on site after obtaining a burning permit from the local fire department. Additionally, Andersen AFB would continue its aggressive pollution prevention program to divert solid waste.

4.4.3.6 Transportation System

The volume of traffic at the intersection of Arc Light Boulevard and Highway 1 and Route 9 and along Route 9 west of the Main Gate would remain at baseline levels. The intersection of

Arc Light Boulevard and Highway 1 and Route 9 at the Main Gate would continue to operate at LOS B during both the morning and afternoon peak hours of traffic.

4.4.4 Mitigation

There are no water, wastewater, energy, communication, solid waste management, and transportation system impacts from either Alternative A or Alternative B that require mitigation.

4.4.5 Cumulative Impacts

Alternative A

The same criteria used to calculate Alternative A infrastructures and utilities were used to determine cumulative impacts. As indicated in Subchapter 2.4, numerous other projects would be accomplished during the same time period as Alternative A. The methods identified and used to estimate Alternative A infrastructure requirements were used for the cumulative conditions. The following data and assumptions apply.

- An additional 1,248 personnel would live and work at Andersen AFB under the other actions, including 788 dependents, and 460 permanent military personnel (145 unaccompanied and 315 accompanied personnel). Thus, when combined with the 3,000 additional personnel associated with Alternative A, the Base population would increase by 4,248 persons.
- A total of about 2.3 million ft² of space would be constructed for repairing and repaving existing taxiways, ramps, and parking areas on Andersen AFB. Thus, when combined with the 3.08 million ft² increase from Alternative A, the total amount of roadways and parking areas would increase by 5.38 million ft².
- A total of about 3.0 million ft² of building space and other structures would be constructed and 2.5 million ft² of space would be demolished on the main Base portion of Andersen AFB under the other actions. Thus, when combined with the 1,918,089 ft² increase from Alternative A at Andersen AFB, the total building space would increase by 3,084,508 ft² (1,166,419 ft² from the other action and 1,918,089 ft² from Alternative A).

Water Supply

Table 4.4-6 presents the cumulative water use for Alternative A. As indicated in the table, water consumption would be 83 percent greater than the No Action Alternative consumption. The 1.081 mgd of water consumption would equate to 24 percent of the new water supply system. The discussion and analysis for water conservation measures, fire demand, water quality, and water storage in Alternative A apply.

Table 4.4-6 Alternative A Cumulative Water Supply Analysis

Line	Condition	Volume	Value
1	Additional personnel	4,248	personnel
2	Per capita consumption	100	gallons per person per day
3	Consumption for cumulative additional Alternative A personnel	424,800	gallons per day
4	Consumption for cumulative additional Alternative A personnel (line 3)	0.425	mgd
5	ISR/Strike aircraft washing/rinsing consumption	0.002	mgd
6	Northwest Field consumption	0.064	mgd
7	Baseline personnel consumption (i.e., excluding water associated with system loss)	0.590	mgd
8	Cumulative Alternative A water consumption (lines 4+5+6+7)	1.081	mgd
9	Cumulative Alternative A consumption compared to No Action Alternative (line 8/line 7)	+83	%
10	System capacity	4.5	mgd
11	Cumulative Alternative A consumption as % of system capacity (line 8/line 10)	24	%

Note: Northwest Field water consumption from Brown and Caldwell 2005.

Wastewater Treatment

Table 4.4-7 presents the cumulative wastewater generation for Alternative A. As indicated in the table, wastewater generation would be 109 percent greater than the No Action Alternative generation. The total wastewater discharge at the WWTP when combining the Base's wastewater and the existing flow would be 9.96 mgd, or about 83 percent of the plant design capacity. The service contract, surface water discharge, wastewater system evaluation, wastewater disposal upgrades, MOU, Section 301(h) of the Clean Water Act, wastewater pre-treatment, and wastewater flow monitoring discussion for Alternative A apply.

Other action projects (see Table 2.4-1) would replace the 20-inch force main and repair the lift stations that have caused sewage back ups and overflows discussed in Subchapter 3.4.2. Automatic overflow detection devices should be installed at the pump stations to notify utilities personnel of impending sewage overflow conditions. All wastewater system upgrades and repairs would comply with Guam EPA wastewater regulations.

Table 4.4-7 Alternative A Cumulative Wastewater Analysis

Line	Condition	Volume	Value
1	Additional personnel	4,248	personnel
2	Per capita generation	35	gallons per person per day
3	Cumulative generation for additional Alternative A personnel	148,680	gallons per day
4	Cumulative generation for additional Alternative A personnel (line 3)	0.149	mgd
5	ISR/Strike aircraft washing/rinsing generation	0.002	mgd
6	Cumulative additional industrial generation	0.060	mgd
7	Northwest Field generation	0.028	mgd
8	Baseline generation	0.220	mgd
9	Cumulative Alternative A generation (lines 4+5+6+7+8)	0.459	mgd
10	Cumulative Alternative A generation compared to No Action Alternative (line 9/line 8)	+109	%
11	Average daily WWTP flow	9.5	mgd
12	Projected WWTP flow (lines 9+line 11)	9.96	%
13	WWTP design capacity	12.0	mgd
14	Alternative A cumulative generation as % of WWTP design capacity (line 12/line 13)	83	%

Note: Design of the wash racks and clear water rinse facility indicate wastewater from the facilities would be discharged to the wastewater collection system. Therefore, the volume of water that would be used at the facilities (see Table 4.4-71) would be discharged to the wastewater collection system. Northwest Field wastewater generation from Brown and Caldwell 2005.

Energy

Building space would increase by 3,084,508 ft² as a result of Alternative A and the other actions. Based on the baseline consumption of 0.0027 kWh per square foot per day and the increase in space, electricity consumption would increase by 8,328 kWh per day. This would equate to an approximate 44.0 percent increase when compared to the average daily No Action Alternative electrical consumption of 18,913 kWh per day and 1.5 percent of the GPA generation capacity. The Andersen AFB electricity use resulting from Alternative A, the other actions, and the existing condition would be 27,241 kWh, which equates to 4.9 percent of the GPA generation capacity. The GPA's power plant 100 percent generation capacity reserve (USAF 2004c) would accommodate the increase in electrical consumption. Repair of the Base distribution as described in Subchapter 3.3 and installation of another 20 MW substation as planned for the ISR/Strike capability would ensure that additional generation could be distributed on the Base. Where practicable, facilities would be constructed in an energy-efficient and sustainable manner as discussed in Subchapter 2.2.1.1.

Communications

According to a systems assessment conducted in June 2004, there are no significant problems or capacity issues with the current Base communications system. To accomplish missions in the future and accommodate mission growth, the Base should continue to implement communications system expansions and improvements (USAF 2004c).

Storm Water Management

An additional 2,867,359 ft² of impervious cover would be constructed at the main Base under the other actions, while 4,733,634 ft² of additional cover would be constructed under Alternative A. Thus, an additional 7,600,993 ft², or 174.5 acres, would be added at Andersen AFB. The additional impervious cover would equate to a 20 percent increase when compared to the No Action Alternative condition of 875 acres of impervious cover at Andersen main. Therefore, the amount of storm water runoff could increase accordingly. The stormwater system upgrade, pre-treatment, UIC stormwater controls, and EPP discussion and analysis for Alternative A apply.

Solid Waste Management

There would be an additional 4,248 personnel working and residing on Base as a result of the other actions. Thus, approximately 10,620 additional pounds per day (5.3 tpd) of solid waste would be generated above the No Action Alternative by mission and residential activities when considering the increase in personnel and the baseline generation rate of 2.5 lbs per person per day. Combining the 5.3 tpd with the baseline of 7.4 tpd, results in 12.7 tpd of solid waste (3,966 tpy) being disposed in a landfill 312 days per year. The increase in disposal equates to 72 percent above the No Action Alternative rates.

Under other actions, a total of 2,980,899 ft² would be constructed, 2,519,467 ft² would be demolished, and 2,291,282 ft² of new pavements would be constructed from other actions. Based on these data and the assumptions listed in Subchapter 4.4.3.5, it is estimated that 123,003 tons of construction and demolition debris would be generated by the other actions. Thus, cumulatively, a total of 150,703 tons of solid waste would be generated (27,700 tons from Alternative A, 123,003 tons from the other actions).

It is estimated the landfill would reach 100 percent capacity by December 2007, regardless of Alternative A and other action activities. A study is currently being conducted to investigate the possibility of vertically extending the current landfill for use beyond 2009. The study is scheduled for completion in January 2007. Thus, Andersen AFB plans to use the expanded on-Base landfill until 2009 or later if the current study supports expansion, and then use a permitted landfill. Although it is not known at this time which landfill would be used, there are three possible options: (1) the proposed GovGuam landfill after it becomes available in 2009-2010; (2) the on-Base landfill that would be constructed as an ISR/Strike project; and (3) the Navy landfill. Planning for the GovGuam and ISR/Strike landfills has not progressed to the point where the capacities or life spans are known. Therefore, quantitative analysis of the impact of the ISR/Strike project on the landfill cannot be accomplished. The landfill permitting and environmental controls discussion for Alternative A applies.

As with Alternative A, the contractor would recycle materials to the maximum extent possible, thereby reducing the amount of construction and demolition debris disposed in the

landfill. Therefore, the discussion and analyses for Alternative A apply. Likewise, the green waste and pollution prevention and recycling discussion for Alternative A applies.

As indicated in Table 2.4-1, one of the other action projects would construct a WTE plant at Andersen AFB. Construction and operation of the facility would reduce the amount of material that would be landfilled. The WTE discussion for Alternative A applies. It is not possible to determine at this time how much MSW could be diverted to the WTE plant because planning for the plant has not been initiated.

Transportation

Facilities construction and activities under other actions are very similar to Alternative A and could occur in areas near the ISR/Strike projects. The discussion and analysis for on-Base traffic at and around construction sites for Alternative A apply.

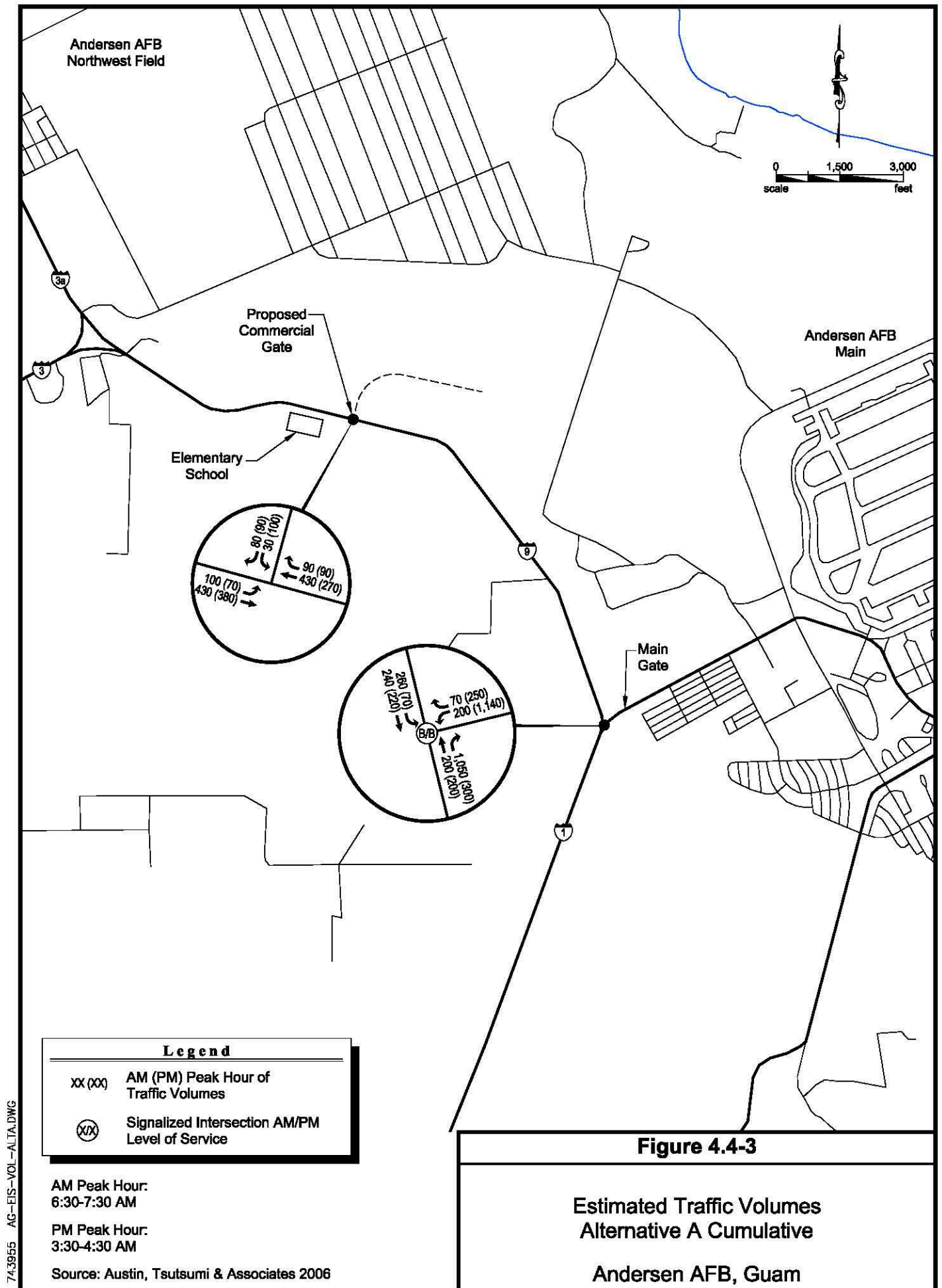
The traffic study completed for the Commercial Gate project estimated that vehicle volumes would double (Austin, Tsutsumi & Associates 2006) when considering the ISR/Strike Alternative A and other projects. Figure 4.4-3 presents the estimated traffic volumes at the intersections of Arc Light Boulevard and Highway 1 and Route 9 and the Commercial Gate for the morning (6:30-7:30 a.m.) and afternoon (3:30-4:30 p.m.) peak hours of traffic for Alternative A and the other actions. Data for the intersection of Route 9 and the Commercial Gate reflect 10 vehicles per hour for an 8-hour work day (Austin, Tsutsumi & Associates 2006).

Based on the volume data depicted on Figure 4.4-3 for the intersection of Arc Light Boulevard and Highway 1 and Route 9 and the LOS definitions in Subchapter 3.4.6, it is estimated that the LOS for the intersection would be LOS C or better during the peak hours of traffic. The baseline condition for the intersection is LOS B. At LOS C most experienced drivers are comfortable, roads remain safely below but efficiently near capacity, and posted speed is maintained. The 2006 traffic study found that a traffic signal is not warranted for the intersection of the Commercial Gate and Route 9 and the intersection would operate at LOS B or better.

Alternative B

The same criteria used to calculate Alternative B infrastructures and utilities were used to determine cumulative impacts. As indicated in Subchapter 2.4, numerous other projects would be accomplished during the same time period as Alternative B. The methods identified and used to estimate Alternative B infrastructure requirements were used for the cumulative conditions. The following data and assumptions apply:

- An additional 1,248 personnel would live and work at Andersen AFB under the other actions, including 788 dependents, and 460 permanent military personnel (145 unaccompanied and 315 accompanied personnel). Thus, when combined with the 1,850 additional personnel associated with Alternative B, the Base population would increase by 3,098 persons.
- A total of about 2.3 million ft² of space would be constructed for repairing and repaving existing taxiways, ramps, and parking areas on Andersen AFB main airfield. Thus, when combined with the 3.08 million ft² increase from Alternative B, the total amount of roadways and parking areas would increase by 5.38 million ft².



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A total of about 3.0 million ft² of building space and other structures would be constructed and 2.5 million ft² of space would be demolished on the main Base portion of Andersen AFB under the other actions. Thus, when combined with the 1,452,940 ft² increase from Alternative B at Andersen AFB, the total building space would increase by 2,619,359 ft² (1,166,419 ft² from the other actions and 1,452,940 ft² from Alternative B).

Water Supply

Table 4.4-8 presents the cumulative water use for Alternative B. As indicated in the table, water consumption would be 64 percent greater than the No Action Alternative consumption. The 0.97 mgd of water consumption would equate to 21 percent of the new water supply system. The discussion and analysis for water conservation measures, fire demand, water quality, and water storage in Alternative A apply.

Table 4.4-8 Alternative B Cumulative Water Supply Analysis

Line	Condition	Volume	Value
1	Additional personnel	3,098	personnel
2	Per capita consumption	100	gallons per person per day
3	Consumption for cumulative additional Alternative B personnel	309,800	gallons per day
4	Consumption for cumulative additional Alternative B personnel (line 3)	0.310	mgd
5	ISR/Strike aircraft washing/rinsing consumption	0.002	mgd
6	Northwest Field consumption	0.064	mgd
7	Baseline personnel consumption (i.e., excluding water associated with system loss)	0.590	mgd
8	Cumulative Alternative B water consumption (lines 4+5+6+7)	0.966	mgd
9	Cumulative Alternative B consumption compared to No Action Alternative (line 8/line 7)	+64	%
10	System capacity	4.5	mgd
11	Cumulative Alternative B consumption as % of system capacity (line 8/line 10)	21	%

Note: Northwest Field water consumption from Brown and Caldwell 2005.

Wastewater Treatment

Table 4.4-9 presents the cumulative wastewater generation for Alternative B. As indicated in the table, wastewater generation would be 96 percent greater than the No Action Alternative generation. The total wastewater discharge at the WWTP when combining the Base's wastewater and the existing flow would be 9.916 mgd, or about 83 percent of the plant design capacity. The service contract, surface water discharge, wastewater system evaluation, wastewater disposal upgrades, MOU, Section 301(h) of the Clean Water Act, wastewater pre-treatment, and wastewater flow monitoring discussion for Alternative A apply. The wastewater treatment collection system upgrades discussion from the Alternative A cumulative impact discussion also applies.

Table 4.4-9 Alternative B Cumulative Wastewater Analysis

Line	Condition	Volume	Value
1	Additional personnel	3,098	personnel
2	Per capita generation	35	gallons per person per day
3	Cumulative generation for additional Alternative B personnel	108,430	gallons per day
4	Cumulative generation for additional Alternative B personnel (line 3)	0.108	mgd
5	ISR/Strike aircraft washing/rinsing generation	0.002	mgd
6	Cumulative additional industrial generation	0.058	mgd
7	Northwest Field generation	0.028	mgd
8	Baseline generation	0.220	mgd
9	Cumulative Alternative B generation (lines 4+5+6+7+8)	0.416	mgd
10	Cumulative Alternative B generation compared to No Action Alternative (line 9/line 8)	+96	%
11	Average daily WWTP flow	9.5	mgd
12	Projected WWTP flow (line 9+line 11)	9.916	%
13	WWTP design capacity	12.0	mgd
14	Alternative B cumulative generation as % of WWTP design capacity (line 12/line 13)	83	%

Note: Design of the wash racks and clear water rinse facility indicate wastewater from the facilities would be discharged to the wastewater collection system. Therefore, the volume of water that would be used at the facilities (see Table 4.4-9) would be discharged to the wastewater collection system. Northwest Field wastewater generation from Brown and Caldwell 2005.

Energy

Building space would increase by 2,619,359 ft² as a result of Alternative B and the other actions. Based on the baseline consumption of 0.0027 kWh per square foot per day and the increase in space, electricity consumption would increase by 7,072 kWh per day. This would equate to an approximate 37 percent increase when compared to the average daily No Action Alternative electrical consumption of 18,913 kWh per day and 1.3 percent of the GPA generation capacity. The Andersen AFB electricity use resulting from Alternative B, the other actions, and the existing condition would be 25,985 kWh, which equates to 4.7 percent of the GPA generation capacity. The GPA's power plant 100 percent generation capacity reserve (USAF 2004c) would accommodate the increase in electrical consumption. Repair of the Base distribution as described in Subchapter 3.3 and installation of another 20 MW substation as planned for the ISR/Strike capability would ensure the additional generation could be distributed on the Base. Where practicable, facilities would be constructed in an energy-efficient and sustainable manner as discussed in Subchapter 2.2.1.1.

Communications

The discussion for Alternative A cumulative impact analysis applies to Alternative B.

Storm Water Management

Additional impervious cover of 2,867,359 ft² would be constructed at the main Base under the other actions, while 4,268,485 ft² of additional cover would be constructed under Alternative B. Thus, an additional 7,135,844 ft², or 163.8 acres, would be added at Andersen

AFB. The additional impervious cover would equate to a 18.7 percent increase when compared to the No Action Alternative condition of 875 acres of impervious cover at Andersen AFB main base. Therefore, the amount of storm water runoff could increase accordingly. The stormwater system upgrade, pre-treatment, UIC stormwater controls, and EPP discussion and analysis for Alternative A apply.

Solid Waste Management

There would be an additional 3,098 personnel working and residing on Base as a result of the other actions. Thus, approximately 7,745 additional pounds per day (3.9 tpd) of solid waste would be generated above the No Action Alternative by mission and residential activities when considering the increase in personnel and the baseline generation rate of 2.5 pounds per person per day. Combining the 3.9 tpd with the baseline of 7.4 tpd, results in 11.3 tpd of solid waste (3,526 tpy) being disposed in a landfill 312 days per year. The increase in disposal equates to 53 percent above the No Action Alternative rates.

Under other actions, a total of 2,980,899 ft² would be constructed, 2,519,467 ft² would be demolished, and 2,291,282 ft² of new pavement would be constructed. Based on these data and the assumptions listed in Subchapter 4.4.3.5, it is estimated that 123,003 tons of construction and demolition debris would be generated by the other actions. Thus, cumulatively, a total of 146,803 tons of solid waste would be generated (26,800 tons from Alternative B, 123,003 tons from the other actions).

It is estimated the landfill would reach 100 percent capacity by December 2007, regardless of Alternative B and other action activities. A study is currently being conducted to investigate the possibility of vertically extending the current landfill for use beyond 2009. The study is scheduled for completion in January 2007. Thus, Andersen AFB plans to use the expanded on-Base landfill until 2009 or later if the current study supports expansion, and then use a permitted landfill. Although it is not known at this time which landfill would be used, there are three possible options: (1) the proposed GovGuam landfill after it becomes available in 2009-2010; (2) the on-Base landfill that would be constructed as an ISR/Strike project; and (3) the Navy landfill. Planning for the GovGuam and ISR/Strike landfills has not progressed to the point where the capacities or life spans are known. Therefore, quantitative analysis of the impact of the ISR/Strike project on the landfill cannot be accomplished. The landfill permitting and environmental controls discussion for Alternative A applies. Likewise, the WTE plant discussion for the Alternative A cumulative impacts also applies.

As with Alternative A, the contractor would recycle materials to the maximum extent possible, thereby reducing the amount of construction and demolition debris disposed in the landfill. Therefore, the discussion for Alternative A cumulative impact analysis applies to Alternative B. Likewise, the green waste and pollution prevention and recycling discussion for Alternative A also applies.

Transportation

Other actions facilities construction and activities are very similar to Alternative B and could occur in areas near the ISR/Strike projects. The discussion and analysis for on-Base traffic at and around construction sites for Alternative A applies.

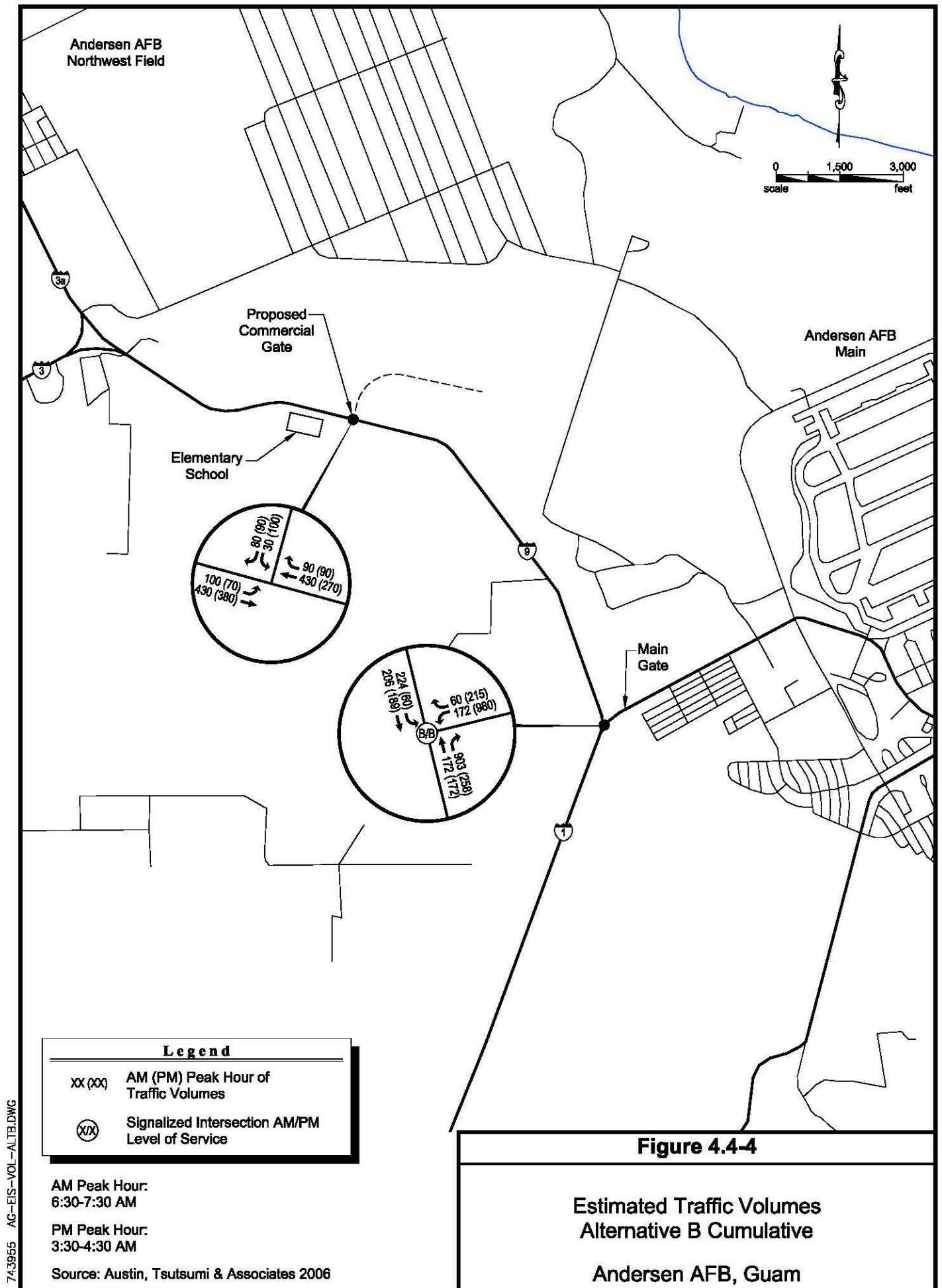
The traffic study completed for the Commercial Gate project estimated that vehicle volumes would double (Austin, Tsutsumi & Associates 2006) when considering the ISR/Strike Alternative B and other projects. Figure 4.4-4 presents the estimated traffic volumes at the intersections of Arc Light Boulevard and Highway 1 and Route 9 and the Commercial Gate for the morning (6:30-7:30 a.m.) and afternoon (3:30-4:30 p.m.) peak hours of traffic for Alternative B and the other actions. The estimated levels of traffic are prorated on the assumption that the doubling of traffic applies to the condition that would result from the combination of the ISR/Strike project and the other actions identified in Subchapter 2.4. Adding the 3,098 additional persons associated with Alternative B and the other actions to the current base population would equate to 86 percent of the doubled condition estimated by Austin, Tsutsumi & Associates 2006. Therefore, the traffic estimates for the Arc Light Boulevard intersection with Highway 1 and Route 9 on Figure 4.4-4 reflect 86 percent of the doubled baseline data for the intersection (see Figure 3.4-1). Data for the intersection of Route 9 and the Commercial Gate reflect 10 vehicles per hour for an 8-hour work day (Austin, Tsutsumi & Associates 2006).

Based on the volume data depicted on Figure 4.4-4 for the intersection of Arc Light Boulevard and Highway 1 and Route 9 and the LOS definitions in Subchapter 3.4.6, it is estimated that the LOS for the intersection would be LOS C or better during the peak hours of traffic. The baseline condition for the intersection is LOS B. The ability to pass or change lanes is not always assured at LOS C. At LOS C most experienced drivers are comfortable, roads remain safely below but efficiently near capacity, and posted speed is maintained. The 2006 traffic study found that a traffic signal is not warranted for the intersection of the Commercial Gate and Route 9 and the intersection would operate at LOS B or better.

4.5 BIOLOGICAL RESOURCES

Biological resources analyses used the following evaluation criteria to assess the impacts of the alternatives:

- The extent, if any, that the action would diminish suitable habitat for a plant or animal species;
- The extent, if any, that the action would diminish population sizes or distribution of regionally important plant or animal species;
- The extent, if any, that the action would be likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species;
- The extent, if any, that the action would permanently lessen physical and ecological habitat qualities that listed species depend upon, and which partly determines the species' prospects for conservation and recovery; or
- The extent, if any, that the action would be inconsistent with the goals of the Andersen AFB INRMP.



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4.5.1 Alternative A

Construction activities associated with Alternative A would involve land clearing, some of which supports elements of suitable habitat for listed species. Ungulate exclosure fencing is proposed to fence 200 hectares (494 acres) near Ritidian Point. A Wildlife Management Specialist would conduct and manage depredation hunts within ungulate exclosure fencing units.

Because the proposed activities would involve clearing and grading, a Guam EPA permit and EPP would be required. Prior to the commencement of earthmoving activities, local government clearances from the Department of Agriculture, Department of Parks and Recreation, and the GSHPO would also need to be obtained.

4.5.1.1 Vegetation

Under Alternative A, approximately 74 hectares (183 acres) would be subject to clearing activities associated with construction. This area accounts for 1.7 percent of the Refuge Overlay and the Ritidian Unit of the GNWR. The most intact forested areas subject to clearing activities were classified as *Neisosperma-Macaranga* forest, amounting to 1.4 hectares (3.5 acres), which is less than 0.1 percent of the Refuge Overlay and the Ritidian Unit of the GNWR. Within this forest type, primary limestone forest characteristics exist; however, lacking a typical overstory of primary limestone forest and regeneration of upper canopy species, this forest type is considered a secondary growth limestone forest. All vegetation communities within the project areas contain native species. The number of hectares removed from each vegetation community type is shown in Table 4.5-1.

All other facility modifications and new construction for Alternative A would take place in developed areas on Base maintained as urban landscape. Therefore, there would be no additional impact to any forested areas or native vegetation from Alternative A.

4.5.1.2 Wildlife

Introduced Terrestrial Species

The clearing of approximately 74 hectares (183 acres) of habitat would displace BTSs and other predators, increasing numbers in adjacent habitat areas. Based on the inspection procedures outlined in Subchapter 3.5.2.1, there would be a low potential for transporting the BTS to offsite locations due to Alternative A. Conservation measures, as part of Alternative A, would reduce numbers of BTS populations at Pati Point. Removal of exotic predators supports recovery actions for listed species outlined in various USFWS recovery plans.

The Base would use the Armed Forces Pest Management Board Technical Guide No. 37 *Guidelines for Reducing Feral/Stray Cat Populations on Military Installations in the United States*. Additionally, the base's family housing occupancy guide is provided to each family as it moves into an on-base military family housing unit. Rules for controlling family pets include: pets must be kept on a leash; and pets left outside must be in a fenced yard or on a leash and directly attended by the owner. Failure to comply with the pet control rules can result in revocation of pet privileges.

Table 4.5-1 Vegetation Community Types and Clearing Activities

Vegetation Community Type	Woody Species Observed Within Plots	Woody Sapling Species Observed Within Plots	Total Area Subject to Clearing (hectares)	Total Area Cleared as Percentage of Refuge Overlay and Ritidian Unit ¹ (hectares)
Aglaia – Guamia Forest	Aglaia mariannensis Guamia mariannae Cycas circinalis Ficus prolixa Hibiscus tiliaceus Eugenia thompsonii Morinda citrifolia Neisosperma oppositifolia Maytenus thompsonii Mammea odorata Tabernaemontana rotensis	Aglaia mariannensis Caesalpinia major Guamia mariannae Hibiscus tiliaceus Ixora coccinea Neisosperma oppositifolia Pandanus tectorius Triphasia trifolia	20.5	0.5
Guamia Forest	Guamia mariannae Aglaia mariannensis Hibiscus tiliaceus Cycas circinalis Neisosperma oppositifolia Psychotria mariana	Aglaia mariannensis Guamia mariannae Hibiscus tiliaceus Neisosperma oppositifolia Pandanus tectorius Triphasia trifolia	17.6	0.4
Herbaceous Scrub	Morinda citrifolia Pandanus tectorius Hibiscus tiliaceus Triphasia trifolia	Morinda citrifolia Pandanus tectorius Hibiscus tiliaceus Triphasia trifolia	16.4	0.4
Neisosperma – Macaranga Forest	Guamia mariannae Macaranga thompsonii Neisosperma oppositifolia Aglaia mariannensis Hibiscus tiliaceus Eugenia thompsonii Cycas circinalis Ficus prolixa Premna obtusifolia Morinda citrifolia Intsia bijuga Psychotria mariana Maytenus thompsonii Mammea odorata Pandanus tectorius	Aglaia mariannensis Flagellaria indica. Eugenia thompsonii Guamia mariannae Hibiscus tiliaceus Leucaena leucocephala Macaranga thompsonii Neisosperma oppositifolia Pandanus fragrans Pandanus tectorius Premna obtusifolia Tabernaemontana rotensis Triphasia trifolia	1.4	< 0.1

Table 4.5-1 Vegetation Community Types and Clearing Activities (continued)

Vegetation Community Type	Woody Species Observed Within Plots	Woody Sapling Species Observed Within Plots	Total Area Subject to Clearing (hectares)	Total Area Cleared as Percentage of Refuge Overlay and Ritidian Unit ¹ (hectares)
Hibiscus – Leucaena Shrub	Hibiscus tiliaceus Leucaena leucocephala Pandanus tectorius Aglaia mariannensis Cycas circinalis	Aglaia mariannensis Guamia mariannae Hibiscus tiliaceus Leucaena leucocephala Morinda citrifolia Pandanus tectorius Triphasia trifolia	7.2	0.2
Guamia – Premna Forest	Guamia mariannae Hibiscus tiliaceus Aglaia mariannensis Premna obtusifolia Neisosperma oppositifolia Cycas circinalis Ficus prolixa Macaranga thompsonii Maytenus thompsonii Eugenia thompsonii Pandanus tectorius Triphasia trifolia	Aglaia mariannensis Cycas circinalis Eugenia thompsonii Guamia mariannae Hibiscus tiliaceus Leucaena leucocephala Pandanus tectorius Premna obtusifolia Tabernaemontana rotensis Triphasia trifolia	9.0	0.2
Vitex – Remnant Elaeocarpus Forest	Guamia mariannae Vitex parviflora Cycas circinalis Neisosperma oppositifolia Premna obtusifolia Pandanus tectorius	Aglaia mariannensis Elaeocarpus joga Guamia mariannae Neisosperma oppositifolia Pandanus tectorius Triphasia trifolia Vitex parviflora	1.8	< 0.1
TOTAL			73.9	1.7

Total area cleared as a percentage is calculated as: The total area subject to clearing divided by the total refuge overlay and the Ritidian Unit. The Refuge overlay and the Ritidian Unit is 4,480. For example, in the Aglaia-Guamia forest, $(20.5 / 4,480) * 100 = 0.5 \%$.

Introduced Game Species

Bow hunting for pigs and deer is currently allowed in the area proposed for the ASA facility, and the annual average harvest in this area is quite low. It is expected that once this facility is operational, recreational hunting would no longer be allowed due to safety and security considerations. Although vegetation clearing would remove 74 hectares (183 acres) of habitat, approximately 144 hectares (356 acres) of habitat would be excluded from hunting. Estimations of deer density within project areas are 1.22 deer per hectare (or 0.49 deer per acre) (Parsons 2006), which suggests displacement of 175 deer onto adjacent land. With an estimated feral pig density of 0.21 pigs per hectare (or 0.08 pig per acre), the suggested number of 30 pigs would be displaced. Displacement of ungulates onto adjacent lands would increase browse pressure and further limit forest regeneration. Conservation measures as part of Alternative A address the displacement of ungulates into adjacent forested habitats. The strategy of ungulate impact reduction would be managed by a Wildlife Management Specialist through a comprehensive ungulate management plan. The conservation measures include depredation hunts, ungulate enclosure fencing, and facilitation of research specific to ungulate management.

Ungulate impact reduction supports specific recovery actions for listed species described in various USFWS recovery plans.

4.5.1.3 Threatened and Endangered Species

Table 4.5-2 shows the presence/absence of suitable habitat and the presence/absence of species based on literature review, recent field surveys, and conversations with local environmental personnel covering all federally and locally listed T&E species on Guam and within the ASA and Commercial Gate project areas.

Draft EIS Comment: The assessment of project impacts on Mariana fruit bat habitat does not include an assessment of indirect habitat loss due to human disturbance activities. Forested areas adjacent to the proposed aircraft staging area will be exposed to human activity that may limit the potential of these forests to support the long-term conservation of the Mariana fruit bat. We recommend that these indirect impacts and associated acreage also be included in the assessment on potential habitat loss for this species.

Response: The FEIS was improved and modified as suggested by replacing the data in Table 4.5-4 related to direct and indirect habitat loss with the indirect and direct habitat loss from the USFWS Biological Opinion. Additionally, text in the DEIS that related to Table 4.5-4 was revised in the FEIS to agree with the updated data in the table. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."

Table 4.5-3 lists woody species of value subject to clearing activities. The effects are summarized from the Establishment and Operation of an ISR/Strike Capability Biological Assessment (Parsons 2006), submitted to the USFWS in March 2006, as well as the Biological Opinion (USFWS 2006) associated with the ISR/Strike project. The analysis included in this subchapter considers direct and indirect effects of facility operation and construction, as well as effects of aircraft operations. Direct effects include habitat loss in areas cleared for construction of the proposed facilities. Indirect effects associated with facilities and construction include the reduced use of habitat adjacent to proposed facilities due to auditory and visual disturbance associated with their construction, operation, and maintenance.

Table 4.5-4 lists the estimated habitat loss for listed species associated with the ISR/Strike project. Conservation measures to limit effects on listed species are outlined in Subchapter 2.2.1.2. There are three plant species, one mammal, three birds, three tree snails, and one insect that may have some elements of suitable habitat within the ASA and Commercial Gate project areas. Effects determination for each T&E and sensitive species was based on the following definitions (USFWS 1998):

- "No effect" – The T&E and sensitive species were not present within the ASA or Commercial Gate project areas, or the proposed action would have no effect on the available habitat of T&E and sensitive species.
- "May affect" –The proposed action may pose effects (any) on T&E species or designated critical habitat.
- "May affect – is not likely to adversely affect" – T&E and sensitive species habitat or T&E and sensitive individuals could potentially be present within ASA or Commercial Gate project areas, and the proposed action would have beneficial, insignificant, or discountable effects.
- "May affect – is likely to adversely affect" – T&E and sensitive species habitat or T&E and sensitive individuals could potentially be present within ASA or Commercial Gate project areas, and adverse effects cannot be avoided.

Herritiera longipetiolata. A grove of *H. longipetiolata* would not be affected by construction or operations at the ASA or the Commercial Gate project areas because it is some distance away from the two projects. Conservation measures to reduce the potential effects associated with any Base activities include increasing awareness of environmental concerns, which includes identification of the tree, should more be located in the future. Ungulate exclosures near Ritidian Point, coupled with the proposed ungulate management actions and proposed vegetation studies would support recovery of this species.

Tabernaemontana rotensis. A number of *T. rotensis* individuals occur within the footprint of land clearing. Inventory for *T. rotensis* continues, and the plant appears to be more abundantly distributed than previously thought (Marler 2006). Conservation measures to reduce the effects associated with any Base activities include increasing awareness of environmental concerns, which includes identification of the plant and transplanting seeds and saplings outside the project footprint. Browse pressure does not seem to be a major threat to this species; therefore, outplantings may occur in areas outside of ungulate exclosures. Additional vegetation studies, as part of the proposed action, may identify additional mature trees and sapling concentrations.

Serianthes nelsonii. The six remaining *Serianthes* individuals on Guam would not be affected by construction or operations at the ASA or the Commercial Gate project areas, because they are some distance away from the two projects. Conservation measures to reduce the potential effects associated with any Base activities include increasing awareness of environmental concerns, including identification of the tree, should more be located in the future. Ungulate exclosures near Ritidian Point, coupled with the proposed ungulate management actions and proposed vegetation studies would support recovery actions outlined in the USFWS Recovery Plan for *Serianthes nelsonii* (USFWS 1994).

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Table 4.5-2 Presence / Absence of Suitable Habitat and Species within Project Areas

English Common Name	Scientific Name	USFWS Listed/Guam listed ¹	Required Habitat	Presence / Absence of Habitat	Presence / Absence of Species
VEGETATION					
Hayun lagu	<i>Serianthes nelsonii</i>	E / E	Limestone derived soils; on or near steep hillsides	Present	Not Present
Tree fern	<i>Cyathea lunulata</i>	-- / E	Hills of southern Guam, along drainage slopes	Not Present	Not Present
Ufa halomtano	<i>Heritiera longipetiolata</i>	-- / E	Crevices of rough limestone, especially on cliffs	Present	Not Present
--	<i>Tabernaemontana rotensis</i>	-- / S	Limestone forests along cliff line; edge species that now grows along roadsides and disturbed areas	Present	Present
BIRDS					
Guam rail	<i>Rallus owstoni</i>	E / E	Savannas in southern Guam; scrubby secondary growth in northern Guam. Extirpated from Guam; in captive breeding program on mainland U.S. and Guam.	Present	Not Present
Common moorhen	<i>Gallinula chloropus guami</i>	E / E	Occurs only in wetlands	Not Present	Not Present
Vanikoro swiftlet (Island swiftlet)	<i>Aerodramus vanikorensis bartschi</i>	E / E	Occurs only in caves at south end of Guam	No nesting habitat present Foraging habitat present	Not Present
Micronesian kingfisher	<i>Halcyon cinnamomina cinnamomina</i>	E / E	Native primary growth limestone forest and secondary growth forest to some extent; shrubby habitat of northern Guam. Extirpated from Guam; in captive breeding program on mainland U.S. and Guam.	Present	Not Present
Mariana crow	<i>Corvus kubaryi</i>	E / E	Mature, native forest, late successional secondary forest. Captive breeding programs are in operation on Guam and Rota.	Present	Present
Nightingale reed-warbler	<i>Acrocephalus luscini</i>	E / E	Unique to wetlands.	Not Present	Not Present
Micronesian starling	<i>Aplonis opaca guami</i>	-- / E	No longer known from native forest, but may be present in secondary growth forests	Present	Not Present
Micronesian honeyeater	<i>Myzomela rubrata</i>	-- / E	Uncommon, native resident on Guam; likely extinct	Present	Not Present
MAMMALS					
Mariana fruit bat	<i>Pteropus mariannus mariannus</i>	T / E	Colony east of Pati Point, forages in primary and secondary forest	Present	Present

Table 4.5-2 Presence / Absence of Suitable Habitat and Species within Project Areas (continued)

English Common Name	Scientific Name	USFWS Listed/Guam listed ¹	Required Habitat	Presence / Absence of Habitat	Presence / Absence of Species
REPTILES					
Green sea turtle	<i>Chelonia mydas</i>	T / T	Native resident, rare	Not Present	Not Present
Hawksbill sea turtle	<i>Eretomochelys imbricata</i>	E / E	Native resident, rare	Not Present	Not Present
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E / --	Accidental visitor to Guam	Not Present	Not Present
Loggerhead sea turtle	<i>Caretta caretta</i>	T / --	Accidental visitor to Guam	Not Present	Not Present
Oceanic gecko	<i>Gehyra oceanica</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Micronesian gecko	<i>Perocinias ateles</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Pacific slender-toed skink	<i>Nactus pelagicus</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Snake-eyed skink	<i>Cryptoblepharus poecilopleurus</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Tide-pool skink	<i>Emoia atrocasteta</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Azure-tailed skink	<i>Emoia cyanura</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Slevin's skink	<i>Emoia slevini</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Moth skink	<i>Lipinia noctua</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present

Table 4.5-2 Presence / Absence of Suitable Habitat and Species within Project Areas (continued)

English Common Name	Scientific Name	USFWS Listed/Guam listed ¹	Required Habitat	Presence / Absence of Habitat	Presence / Absence of Species
MOLLUSKS					
-	<i>Allepithema tuberculata</i>	-- / T		Not Present	Not Present
Mt. Alifan tree snail	<i>Partula salifana</i>	-- / E	Closed canopy mesic forest with relatively undisturbed understory	Present	Not Likely Present
Mariana Islands tree snail	<i>Partula gibba</i>	-- / E	Closed canopy mesic forest with relatively undisturbed understory	Present	Not Likely Present
Pacific tree snail	<i>Partula radiolata</i>	-- / T	Closed canopy mesic forest with relatively undisturbed understory	Present	Not Likely Present
Mariana Islands fragile tree snail	<i>Samoana fragilis</i>	-- / E	Closed canopy mesic forest with relatively undisturbed understory	Present	Not Likely Present
INSECTS					
Mariana eight-spot butterfly	<i>Hypolimnus oculata</i> var. <i>mariannensis</i>	-- / E	Karst areas with associative indicator plants (<i>Procris pedunculata</i> , and <i>Elatostema calcareum</i>)	Present	Not Likely Present

¹Listing status: -- = Not listed; E = Endangered; T = Threatened; S = locally sensitive species.

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Table 4.5-3 Woody Species of Value to Listed Species in Project Areas

Woody Species of Value to Listed Species	Occurrence in Areas Proposed for Clearing	
	ISR/Strike	Commercial Gate
<i>Aglaia mariannensis</i> ^{1,2,3}	X	X
<i>Carica papaya</i> ²		X
<i>Elaeocarpus joga</i> ^{1,2,3}		X
<i>Eugenia reinwardtiana</i> ¹	X	
<i>Eugenia thompsonii</i> ¹	X	
<i>Ficus prolixa</i> ^{1,2,3}	X	
<i>Guamia mariannae</i> ^{1,3}	X	X
<i>Guettarda speciosa</i> ²	X	
<i>Hibiscus tiliaceus</i> ¹	X	X
<i>Intsia bijuga</i> ^{1,3}	X	
<i>Leucaena leucocephala</i> ¹	X	X
<i>Macaranga thompsonii</i> ^{1,2}	X	
<i>Mammea odorata</i> ^{1,2}	X	
<i>Maytenus thompsonii</i> ²	X	
<i>Neisosperma oppositifolia</i> ^{1,2,3}	X	X
<i>Pandanus tectorius</i> ^{1,2,3}	X	X
<i>Pisonia grandis</i> ^{1,2,3}	X	
<i>Premna obtusifolia</i> ^{1,3}	X	X
<i>Tristiropsis obtusangula</i> ¹	X	X
<i>Vitex parviflora</i> ^{1,2}	X	X

1 Foraging or nesting habitat for Mariana crow

2 Foraging or roosting habitat for Mariana fruit bat

3 Nesting habitat for Micronesian kingfisher

Table 4.5-4 Habitat Subject to Direct and Indirect Effects for Listed Species

Species	Habitat Type	Direct Loss ¹ (Hectares / Acres)	Indirect Loss ² (Hectares / Acres)	Total Loss (Hectares / Acres)
Mariana Fruit Bat	Foraging	57.5 / 142.1	80 / 197	138 / 340
	Roosting	57.5 / 142.1	128 / 317	186 / 460
Mariana Crow	Foraging	57.5 / 142.1	147 / 363	201 / 506
	Nesting	57.5 / 142.1	147 / 363	201 / 506
Micronesian Kingfisher	Foraging	74 / 183	135 / 334	193 / 477
	Nesting	57.5 / 142.1	101 / 249	159 / 392
Guam Rail	Foraging and Nesting	23 / 57	- / -	23 / 57

1 Direct loss of habitat areas are obtained from associative vegetation communities listed in Table 4.5-1.

2 Indirect loss of habitat areas is obtained from USFWS Biological Opinion (2006). Indirect loss was not calculated for the Guam rail due to lack of information on potential impacts of human disturbance on habitat use.

Animal Species

Mariana fruit bat. No Mariana fruit bats were observed in the ASA or Commercial Gate project areas during the January 2006 survey (Parsons 2006); however, recent telemetry data (Janeke 2006) indicate that clearing of vegetation would occur in a known foraging area for a single Mariana fruit bat female. Figure 3.5-1 and Figure 3.5-2 show the primary habitat that would be disturbed in the ASA project area and the Commercial Gate project area, respectively. Figure 3.5-3 shows locations of recent observations of Mariana fruit bats.

Construction activities would remove secondary growth limestone forest associative trees such as *N. oppositifolia* and *Pandanus* shrubs used by the Mariana fruit bat for foraging (Wiles 1986). Construction would remove approximately 74 hectares (183 acres) of vegetated land, of which, 57.5 hectares (142.1 acres) consist of potential forested and shrub habitat. This removed habitat is 1.3 percent of the GNWR Ritidian Unit and refuge overlay units. The most suitable habitat of these 57.5 hectares (142.1 acres) includes two areas of intact secondary forest overlying karst substrates totaling 1.4 hectares (3.5 acres) in the ASA project area. This relatively higher quality habitat lacks a sufficient emergent canopy layer to be considered primary limestone forest; however, the species composition and canopy structure suggest a higher foraging and roosting potential for the Mariana fruit bat. The 1.4 hectares (3.5 acres) of higher quality habitat of the 57.5 hectares (142.1 acres) of potential habitat represent 0.1 percent of the total refuge overlay and the Ritidian Unit. The removal of 57.5 hectares of habitat may adversely affect the Mariana fruit bat because of the removal of a known foraging territory. Mariana fruit bats primarily forage at night; therefore, daytime construction activities and the use of shielded lights at proposed facilities would not be expected to have severe impacts on foraging

behavior. Therefore, Indirect effects that limit habitat availability include operation of the ASA facility (aircraft entering and leaving the facility, vehicles, and personnel working in the area) (USFWS 2006). As shown in Table 4.5-4, 80 hectares (197 acres) of foraging habitat and 128 hectares (317 acres) of roosting habitat would be lost due to indirect effects. Table 4.5-3 lists woody species of value to the Mariana fruit bat subject to clearing activities. Due to the relatively small amount of habitat removed in relation to available habitat (refuge overlay and Ritidian Unit), and suitable conservation measures to offset effects, any adverse effects would not represent an adverse modification to habitat or jeopardize the species.

Aircraft overflights would occur over areas that contain suitable habitat for roosting and foraging. Although there is suitable vegetation in the ASA and Commercial Gate project areas vegetation community types, the Mariana fruit bat appears to prefer foraging habitat where there are more large fruit trees available, such as the *Neisosperma* – *Macaranga* forest, which contains suitable canopy. Figure 4.5-1 shows noise exposure contours from aircraft operations and aircraft flight track locations. Biological resources analysis points (points A, B, C) were established north of the airfield for noise analysis. The points were selected based on locations of the Mariana fruit bat colony at Pati Point and known foraging sites identified by radio tracks of individual bats in a previous study. Table 4.5-5 lists the combined airfield operation events for all aircraft operating on the aircraft flight tracks within a 2,000-foot radius of various analysis points.

Draft EIS Comment: Though habituation of fruit bats to noise is perceived as most likely to occur, the Draft EIS cites a study of megachiropteran (p. 4-62). There may be differences in tolerances to noise levels between the species, and also, Mariana fruit bats are known to fly from the island of Rota to Guam, providing a source for the Guam population. It is unknown if bats would stay in the area with the increase in noise due to aircraft.

Response: Implementation of the adaptive management conservation measure described in Subchapter 2.2.1.2 would close the data gap identified in the comment. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."

Table 4.5-5 Airfield Operation Events on the Runway and at Points North of the Andersen AFB Airfield

Operations Condition	Point A			Point B			Point C		
	day	dark	total	day	dark	total	day	dark	total
Current Condition	1.8193	0.2087	2.0280	0.0734	0.0000	0.0734	87.1760	21.7940	108.9700
Alternative A	51.0438	2.8714	53.9152	43.5888	2.2903	45.8791	122.0600	23.6300	145.6900
Net Change due to Alternative	+49.2245	+2.6627	+51.8872	+43.5154	+2.2903	+45.8057	+34.8840	+1.8360	+36.7200
Current Condition	88.6380	22.0267	110.7007	0.1534	0.0200	0.1734	0.0000	0.0000	0.0000
Alternative A	144.0056	25.1047	169.1103	9.3842	0.5313	9.9155	34.8840	1.8360	36.7200
Net Change due to Alternative	+55.3677	+3.0419	+58.4096	+9.2308	+0.5113	+9.7421	+34.8840	+1.8360	+36.7200

Note: Data reflect operations on the aircraft flight tracks within a 2,000-foot radius of Pati Point.

Maximum noise levels at Pati Point would not exceed those of the current conditions; however, the frequency of aircraft overflights would increase to an estimated three times per hour, based on additional flight tracks and aircraft operations. Under current conditions, Morton (1996) suggests that bats at the Pati Point colony have become relatively habituated to daytime aircraft noise and continue to roost there. It is unknown if Mariana fruit bats would become habituated to more frequent noise, but recent observations indicate they have become habituated to aircraft noise (Janeke 2005). Studies of habituation in other animal species have not observed any level of tolerance that has eventually become unacceptable to the animals when the type of disturbance has remained constant.

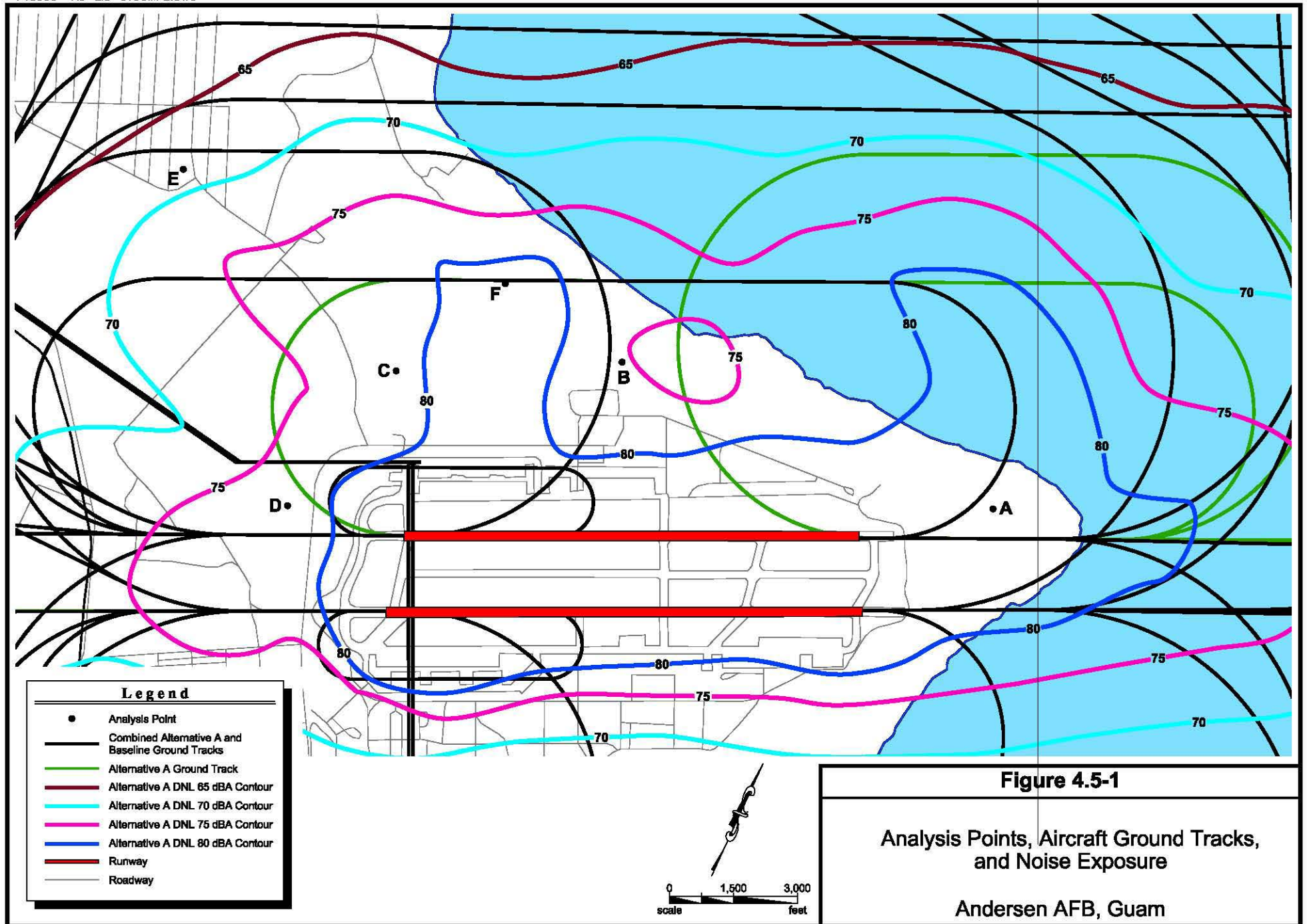
Hearing sensitivity in a related megachiropteran fruit bat, *Rousettus aegyptiacus*, spans from about 2.25 kHz to 64 kHz at a 60 dB sound pressure intensity (Koay, *et al.* 1998). From a behavioral auditory threshold study of *Rousettus aegyptiacus*, their greatest sensitivity is in the range of 8-10 kHz (Suthers and Summers 1980), much higher than the frequency spectrum of aircraft. Interestingly, the study found no behavioral response to sounds below 1 kHz, which indicates that their sensitivity or even ability to hear below that level is low to nonexistent. Much of the acoustic energy of aircraft noise is below 2 kHz.

Habituation of bats to increased overflight noise is expected (Janeke 2005), especially since aircraft overflights would be incrementally increased over a multi-year period. The degree of habituation, however, is not represented in the current literature. Conservation measures involve an Adaptive Management Strategy, which is commonly used when data gaps exist, to continually address noise effects as overflights increase. Conservation measures also allow for modification of overflight patterns to reduce effects of increased aircraft. Modifications would be based on proposed studies of the Mariana fruit bat, as described in Subchapter 2.2.1.2.

Noise events associated with aircraft overflights may affect the Mariana fruit bat. Conservation measures could reduce these effects by applying an Adaptive Management Strategy to modify ground tracks based on monitoring studies. Additional conservation measures include the protection and management of 200 hectares (494 acres) of suitable habitat near Ritidian Point, reducing BTS populations at the Pati Point colony, and adopting an Adaptive Management Strategy that uses scientific research to effect operational changes to overflight routes. Further, these conservation measures directly support recovery actions outlined in the USFWS Mariana Fruit Bat Recovery Plan by addressing the need for habitat restoration and control of BTSs at the Pati Point colony.

Mariana crow. The Mariana crow does not currently nest in the ASA or Commercial Gate project areas. The primary habitat that would be removed in the ASA and Commercial Gate project areas is shown in Figures 3.5-1 and 3.5-2, respectively. Figure 3.5-3 shows the locations of recent observations of the Mariana crow.

Despite the lack of Mariana crows within project areas, construction activities would remove secondary limestone forest associative trees such as *N. oppositifolia* and *G. mariannae* used by the Mariana crow for foraging and/or nesting. Construction activities may lead to forest fragmentation, which may affect the Mariana crow (Andren 1992; Fancy, *et al.* 1999; Plentovich, *et al.* 2005). Although some small suitable habitat patches may be available after construction activities cease, Mariana crows may not use these patches extensively. Table 4.5-3 lists woody species of value to the Mariana crow subject to clearing activities.



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Construction activities would remove 57.5 hectares (142.1 acres) of potential habitat in forested and shrub areas that contain associative trees of the Mariana crow. This amount of removed habitat amounts to 1.3 percent of the Ritidian Unit and the refuge overlay. The most suitable habitat of these 57.5 hectares (includes two areas of intact secondary forest overlying karst substrates totaling 1.4 hectares (3.5 acres) in the ASA project area. This relatively higher quality habitat lacks a sufficient emergent canopy layer to be considered primary limestone forest; however, the species composition and canopy structure suggest a higher attractiveness for the Mariana crow. The 1.4 hectares of higher quality habitat inside the 57.5 hectares (1,42.1 acres) of potential habitat subject to removal represents 0.1 percent of the Ritidian Unit total refuge overlay. In addition to the 57.5 hectares of foraging and nesting habitat subject to direct effects of facilities and construction, 147 hectares (363 acres) of foraging and nesting habitat would be subject to indirect loss associated with the ISR/Strike project. Based on the relatively small amount of habitat removed and the lack of utilization within or adjacent to the project areas, direct and indirect effects of the ISR/Strike project would not adversely affect current populations or future recovery of the Mariana crow.

Operational activities include aircraft overflight. Crows are sensitive to human disturbances, and may be particularly sensitive to noise generated from aircraft (Morton 1996). Aircraft overflights would occur over areas that contain suitable habitat for nesting and foraging. Figure 4.5-1 shows the noise exposure contours from ISR/Strike aircraft operations. Morton (1996) demonstrated that Mariana crows react negatively to aircraft overflight noise and other human disturbances in some cases, but not always. Noise disturbance of the Mariana crow can cause distress in the birds, cause them to flush from the nest and disrupt nest building, incubation, and nest attendance at least temporarily. However, if the Mariana crow nests are abandoned due to disturbance or predation, the pairs generally attempt to re-nest (Morton 1996). In addition, crows may respond to visual stimuli as well as noise stimuli (*e.g.*, aircraft outlines, pedestrians). Other studies demonstrate that birds are likely to hear loud noises (*e.g.*, sonic booms), and stop the activity in which they are engaged (Higgins 1974), but a *Corvus* species study showed the birds rapidly returned to normal activities after the noise event (Davis 1967).

There is some indication that Mariana crows can be tolerant of disturbances, much like related species of crows throughout the world. The fact that Morton (1996) observed some pairs reneesting after nest disturbances may indicate their tenacity. This tolerance can lead to habituation of disturbances that are not threatening to the individuals. Habituation is a process many species of animals undergo to cope with or tolerate environmental stimuli inconsequential to their livelihood or well-being. Animals like those discussed in the Morton (1996) study responded to visual and acoustic stimuli potentially harmful to them. Typically, this is because of their innate predator-prey response mechanism, which causes an increase in alertness or flushing or fleeing from the impending threat. There are many studies showing that recurring events without consequence cause animals to eventually ignore those stimuli. Busnel (1978) observed that many species are able to habituate to noise disturbance. Andersen, *et al.* (1989) concluded that Red-tailed hawks could have habituated to aircraft noise. Becker (2002) suspected roosting Bald eagles were habituated to disturbances when exposed to a large industrial construction project. Delaney, *et al.* (1999) found that endangered Mexican spotted owls become habituated to disturbances like chainsaw noise and helicopter noise. Observations of Mariana crows and Mariana fruit bats by Morton (1996) during aircraft flyover events

demonstrated there were reactions in some cases where some observed individuals responded to the noise or visual stimuli and others did not. This could be due to the experience level of the animals, where resident crows or bats were habituated to the aircraft events, and non-resident or young were not accustomed to the intrusions.

Aircraft altitudes in areas where Mariana crows have established nests in the past (Morton 1996) would be 300 meters (984 feet) AGL and greater. Noise modeling was accomplished to determine the maximum sound level at two of the 10 analysis points (*i.e.*, Pati Point and Tarague Channel) selected for noise analysis (see Subchapter 4.1) and four biological resources analysis points in the area north and northwest of the airfield where there is suitable habitat for Mariana crow nesting activities. Sound levels from noise modeling were compared to information from the Morton (1996) study to determine the potential for effect.

Based on noise modeling, the maximum sound level produced by any of the ISR/Strike aircraft would be 108 dBA by B-1 aircraft at Pati Point, and 87 dBA by F-22 aircraft at Tarague Channel. The maximum sound level at any of the four other points in the area north and northwest of the airfield would be 109 dBA from F-22 aircraft.

Noise modeling indicated that the maximum sound levels (L_{\max}) produced under the proposed action (*i.e.*, 108 dBA by the B-1 aircraft at Pati Point) would be 2 dBA less than the maximum noise from the Morton (1996) study (*i.e.*, 110 dBA). Additionally, the maximum proposed action sound level at any of the four other points north and northwest of the airfield where the Mariana crow is known to occur would be 109 dBA, which is 1 dBA less than the Morton (1996) study. Noise from aircraft overflights did not cause nest abandonment for at least one pair of Mariana crows when aircraft were restricted to altitudes greater than 300 meters (984 feet) AGL (Morton 1996). Based on the similarities of the maximum noise levels and AGL when comparing the Morton (1996) study and the proposed action, Mariana crow reaction to noise would be expected to be similar or less than that found in the Morton study; that is, some crows might flush from the nest, while others show no negative effects. Additionally, there is a possibility that Mariana crows habituate to aircraft noise since there is no negative reinforcement to cause nest abandonment.

Noise from aircraft overflights are expected to affect Mariana crow behavior. Conservation measures would reduce these effects by applying an Adaptive Management Strategy to modify ground tracks based on monitoring studies. Further, conservation measures would designate approximately 200 hectares (494 acres) of forested land, some of which is currently utilized by the Mariana crow, as a conservation land use category. Management actions for these 200 hectares (494 acres) include ungulate exclosure fencing, ungulate depredation hunts, and forage plot establishment.

Micronesian kingfisher. The Micronesian kingfisher has been extirpated from the wild and persists in captive breeding populations. Survey data from 1981 indicate that Micronesian kingfishers were present in the northern portion of Andersen AFB, but not at Andersen main. Construction would remove 57.5 hectares (142.1 acres) of secondary growth forest and shrubby areas that are potential foraging and nesting habitat for the Micronesian kingfisher. The area represents 1.3 percent of the refuge overlay and the Ritidian Unit. Of the 57.5 hectares (142.1 acres) of potential habitat for the Micronesian kingfisher, 1.4 hectares (3.5 acres) have been identified as more suitable habitat, which amounts to 0.1 percent of the refuge overlay and

the Ritidian Unit. Table 4.5-3 lists woody species of value to the Micronesian kingfisher subject to clearing activities. In addition to the 57.5 hectares of foraging habitat and 74 hectares (183 acres) of nesting habitat subject to direct effects of facilities and construction, 135 hectares (334 acres) of foraging habitat and 101 hectares (249 acres) of nesting habitat would be subject to indirect loss associated with the ISR/Strike project. Based on the relatively small amount of habitat removed and the lack of utilization within or adjacent to the project areas, direct and indirect effects of the ISR/Strike project would not adversely affect current populations or future recovery of the Micronesian kingfisher.

The small amount of habitat loss from the proposed action would have no impact on plans to reintroduce the Micronesian kingfisher into MSA 1. Habitat for this species within MSA 1 would not be disturbed by construction. The DNL 65 dBA noise contour from aircraft operations would extend into the southernmost portion of MSA 1. Maximum sound pressures from aircraft overflight in southern MSA 1 is 97 dBA.

Guam rail. Guam rails have been extirpated in the wild and persist as captive breeding populations. As a ground nesting species, the Guam rail is particularly susceptible to predation by the BTS and egg predation by feral pigs and feral cats (GovGuam DAWR 1999; 2000b).

Construction in the ASA and Commercial Gate project areas would remove 23 hectares (57.5 acres) of suitable habitat. This amount of vegetation represents 1 percent of the refuge overlay and the Ritidian Unit. Because of the relatively small amount of habitat subject to clearing, and due to the lack of a wild population, construction activities would not adversely affect recovery efforts of the Guam rail. Further, areas previously targeted for re-introductions would not be subject to noise increases sufficient to adversely affect recovery efforts of the Guam rail.

Mariana Islands Tree Snail, Pacific Tree Snail, Mariana Islands Fragile Tree Snail. Suitable habitat for all three species includes mesic, relatively closed-canopy forest, where ground disturbance has been minimal or absent. Although degraded, some habitat is present in the ASA project area. No snails were observed during the field surveys (Parsons 2006). The presence of invasive snail predators reduces the potential success for this species (Hopper and Smith 1992; Wiles, *et al.* 1995; GovGuam DAWR 2005). Construction would remove 1.4 hectares (3.5 acres) of suitable habitat. This represents less than 0.1 percent of the refuge overlay and the Ritidian Unit. Removal of snail habitat for these snails is small enough to not adversely affect current populations. Further, aircraft overflights are expected to have no effect on the snail species recovery or current populations.

Mariana Eight-spot Butterfly. No butterflies or associative plants were observed in the ASA or Commercial Gate project areas during the January 2006 survey. Although degraded due to ungulate browse pressure, there is a small amount of potential karst habitat present in the ASA project area. Construction would remove 1.4 hectares (3.5 acres) of potentially suitable habitat. This represents less than 0.1 percent of the refuge overlay and the Ritidian Unit. This relatively small amount of habitat subject to removal would not adversely affect the Mariana eight-spot butterfly. In addition, aircraft overflights are not expected to adversely affect this species of butterfly.

Offsite Effects for T&E Species

Base population could increase by about 3,000 persons when considering additional military personnel and dependents. These individuals would travel to and from Guam by commercial air carrier flights that use Guam International Airport. The majority of the household goods belonging to permanently assigned personnel would be transported as cargo in ships. Thus, there could be an additional approximate 220 household good shipments each year. The additional containers for the household goods would require USDA inspection for the BTS. The USDA would use the updated BTS inspection procedures to attain 100 percent inspection of outgoing ships and cargo. Rotational personnel would bring only personal effects, and those articles could be accommodated as baggage on the aircraft on which the individuals travel. Because 100 percent inspection of all outbound cargo from Andersen AFB would occur, the proposed action would not adversely affect offsite T&E species.

Summary of Effects Determination on T&E Species

The effects determinations for species relevant to this EIS are listed in Table 4.5-6.

Table 4.5-6 Effects Determination

Species	Potential Effects of Construction	Potential Effects of Operations
<i>Heritiera longipetiolata</i>	No effect	No effect
<i>Serianthes nelsonii</i>	No effect	No effect
<i>Tabernaemontana rotensis</i>	May affect	May affect
Mariana fruit bat	May adversely affect	May adversely affect
Mariana crow	May affect	May affect
Micronesian kingfisher	May affect	May affect
Guam rail	May affect	May affect
Mariana Islands tree snail	May affect	No effect
Pacific tree snail	May affect	No effect
Mariana Islands fragile tree snail	May affect	No effect
Mariana eight-spot butterfly	May affect	No effect

With the exception of the Mariana fruit bat, the proposed action may affect, but not adversely affect, populations of existing species as well as recovery of species populations. Although the project footprint has been altered to limit impacts to intact secondary limestone forest (see Subsection 2.2.1.2), the clearing of vegetation would impact one known Mariana fruit bat foraging area. This clearing of habitat would represent an adverse effect; however, the clearing would not jeopardize the continued existence of the species, nor would the clearance adversely modify the overall habitat. The effects determination for the proposed action is based on the following assumptions:

- Existing conditions for listed species within habitat areas of the overlay refuge continue to degrade. Excessive ungulate pressure prevents recruitment of emergent canopy species within forested areas, while BTS predation limits recovery of listed species.

- The size of the areas subject to clearing are relatively small in comparison to available habitat. Vegetation clearing would remove less than 74 hectares, which represent approximately 1.6 percent of the combined area of the GNRW Ritidian Unit and refuge overlay units. This small amount of clearing would not adversely affect listed species.
- Noise from aircraft overflights would affect Mariana fruit bat and Mariana crow recovery efforts, as well as current populations. Based on current literature and field observations, habituation to an incremental increase of overflights is expected. Further, adverse effects that do become apparent due to aircraft operations would initiate modifications to aircraft ground tracks and profiles over sensitive areas, through an Adaptive Management Strategy. This Adaptive Management Strategy involves a multi-year monitoring program of noise effects using up-to-date standards for acoustical studies on sensitive species, and could affect operational changes.
- Implementation of the conservation measures described in Subchapter 2.2.1.2 would reverse the continued degradation of approximately 200 hectares (494 acres) of important habitat, and therefore, contribute to the recovery of listed species. In addition, conservation measures address issues associated with exotic predator interdiction and control. Many of the conservation measures correspond directly to management needs identified as critical recovery actions in USFWS recovery plans for listed species. Further, the conservation measures would effectively manage areas of higher quality habitat for listed species. Therefore, the species may utilize the better-quality habitat that would be effectively enhanced by the conservation measures, rather than the relatively lower quality habitat currently present at Andersen main.

Natural Resources Planning

Under Alternative A, project goals described in the Andersen AFB INRMP (2002) would be supported by conservation measures included in the proposed action. Conservation measures call for the designation of 200 hectares (494 acres) of ungulate exclosure fencing units as a conservation classification. Further, conservation measures as part of Alternative A would support recovery actions outlined in various USFWS recovery plans for listed species.

4.5.1.4 Summary of Biological Opinion

Formal Section 7 consultation was concluded with the USFWS issuance of the BO in response to the BA. The BO, which was issued after the Draft EIS public comment period, concluded that the ISR/Strike project is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA. The determination by USFWS is based on the following factors summarized from the BO (see Appendix E):

- No jeopardy determinations for listed species are based on conservation measures described in Subchapter 2.2.1.2 of the Final EIS;
- An Adaptive Management Strategy will develop and implement additional avoidance, minimization, and offset measures, based on the best available science subject to USFWS approval;

- The proposed action is not anticipated to compromise recovery efforts of listed species; and
- The Air Force has agreed to implement measures that avoid, minimize, and/or offset potential impacts associated with the proposed action, included in Subchapter 4.5.4 of the Final EIS.

The USFWS issued with the BO an Incidental Take Statement for the Mariana fruit bat. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the USFWS to include significant habitat modification or degradation that results in the death or injury to listed species by significantly impairing essential behavior patterns. Harass is defined by the USFWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns. No take of Mariana crows, Micronesian kingfishers, or Guam rails will occur from the ISR/Strike project, and the level of anticipated take for the Mariana fruit bat is not likely to jeopardize the continued existence of the Mariana fruit bat. The Incidental Take Statement anticipates the following forms of incidental take:

- The take of one Mariana fruit bat foraging territory in the form of harm, as a result of clearing and construction of the ASA project area; and
- The take of two Mariana fruit bat colonies and 21 Mariana fruit bats on Guam and 36 Mariana fruit bats from Rota will occur in the form of harassment and death as a result of aircraft disturbance associated with overflights and subsequent illegal poaching activities.

The Incidental Take Permit includes non-discretionary reasonable and prudent measures that are necessary and appropriate to minimize the impacts of incidental take of the Mariana fruit bat. Summaries of these measures are included as mitigation in Subchapter 4.5.4.

4.5.2 Alternative B

Except for the family housing units and family housing management facilities that would not be constructed under Alternative B, the facilities construction and activities are identical to Alternative A. Therefore, the discussion and analysis for Alternative A apply to Alternative B.

4.5.3 No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established. No land clearing would occur northwest of the runways at Andersen main, and there would be no reduction in land identified as the overlay refuge. Public hunting would not be curtailed on this same land.

Vegetation and Wildlife

Although no vegetation clearing would occur, the degradation of northern limestone forest on Andersen AFB would continue. The uncleared land would continue to be judged as low quality, modified forest with little to no prospects for gradual improvement by seral succession because of the overriding cascading effects of prior land use. Plant and animal species resources,

which include T&E species, would not change from baseline conditions. Continued encroachment of invasive herbaceous species would be expected.

Hunting levels would remain constant and consistent with the Base hunting procedures currently in effect. Deer and pig populations would remain at current levels. BTS interdiction would remain at current levels with a low probability of transporting the BTS offsite.

Threatened and Endangered Species

The habitat on Andersen AFB main would remain marginal for supporting endangered species. Continued foraging, however, in the ASA would be expected. No conservation measures would be implemented that directly support recovery actions of listed species outlined in USFWS recovery plans. The No Action Alternative has low potential for enhancing recovery or repopulation of these species.

Natural Resources Planning

The conservation measures that support projects in the INRMP would not be implemented, and no land use designations would change.

4.5.4 Mitigation

Mitigation, as defined by the CEQ (40 CFR Part 1508.20), includes the following concepts:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by providing substitute resources or environments.

“Compensating” and “minimizing” are common to both the Section 7 consultation process and the CEQ guidance for accomplishing environmental impact analysis under NEPA. Conservation measures were identified during the scoping and Section 7 consultation processes, and were included in the proposed action in Subchapter 2.2.1.2. Implementation of the conservation measures would minimize and compensate for potential effects of the ISR/Strike project on the species under review. These conservation measures are described in Subchapter 2.2.1.2. The Air Force has agreed to non-discretionary terms and conditions associated with the Incidental Take Statement from the BO (see Appendix E) and Subchapter 4.5.1.4.

4.5.5 Cumulative Impacts

Cumulative impacts would result from the additive effects of removing forested areas, fragmenting the habitat, disturbances due to aircraft operations, or impacts to food sources. For the purposes of this EIS, the following proposed and ongoing projects are considered for cumulative effects:

- The Aircraft Staging Area associated with the ISR/Strike project (Alternative A);
- The Commercial Gate associated with implementation of the ISR/Strike capability (Alternative A);
- Beddown of Training and Support Initiatives at Northwest Field; and
- MSA 1 project area.

Some vegetation that may provide suitable trees for the recovery and protection of listed species would be removed within each of these areas (see Table 4-5.7). The total vegetation removed from all projects combined would be approximately 122.7 hectares (303.2 acres), which is 2.7 percent of available refuge land. Table 4.5-8 lists each project area with proposed areas for clearing. Removal of this amount of vegetation would not be expected to jeopardize the recovery and continued existence of listed species. Further, conservation measures, as integral parts of the proposed actions, are designed to enhance habitat by addressing conservation issues in northern limestone forests of Guam. These issues include ungulate control to facilitate forest regeneration through depredation and exclosure fencing, BTS control and interdiction, and continued field research. The conservation measures support recovery actions of various USFWS recovery plans for listed species.

Draft EIS Comment: We view the loss of 122 hectares as impacting the recovery and preservation of Guam's native wildlife, especially the federally endangered Mariana crow, Micronesian kingfisher, and threatened Mariana fruit bat.

Response: The conservation measures stated in Subchapter 2.2.1.2 of the FEIS were tailored to correspond to the USFWS recovery plans for the Mariana crow, Micronesian kingfisher, and Mariana fruit bat. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."

Cumulative Impacts Concerning Off-Site Effects on T&E Species

Potential adverse effects to offsite ecosystems include transport of BTSs from Andersen AFB in association with the off-island transport of people and cargo from ISR/Strike and Northwest Field activities. Assigned personnel and their dependents would rotate every 2 to

Draft EIS Comment: The cumulative impacts of these projects and future actions will negatively impact the Overlay Refuge and the species dependent upon it.

Response: As discussed in Subchapter 4.5.5, implementation of the conservation measures in Subchapter 2.2.1.2 for the ISR/Strike action and in Subchapter 2.4.2.2 (Northwest Field action) would minimize the potential for negative impact to the Overlay Refuge and the species dependent on it.

3 years. This represents approximately 410 families as well as their household goods requiring transport from the island to other locations. These individuals would likely depart via commercial aircraft from the Guam International Airport. There would be an increase of outgoing household goods through the Andersen AFB air freight terminal. Small portions of personnel goods would be shipped via air freight, most likely on military aircraft. Thus, there could be a requirement for the USDA WS to annually inspect as many as 410 additional containers that could be shipped via air freight from Andersen AFB. These additional shipments would be sent as air freight on routine cargo movement flights from

Andersen AFB, and there should be no requirement for additional aircraft to transport the household goods. However, the additional containers for the household goods would require USDA WS inspection for the BTS. An estimated 194 rotational aircraft and contract aircraft carrying rotational personnel would depart Andersen AFB annually to return to their home station. These aircraft would move in groups. While this action represents less than one aircraft per day over a year, group movement would require a surge in USDA WS inspection capacity on

the days rotational aircraft depart. The Air Force would ensure a 100 percent BTS inspection program for aircraft and goods departing the Andersen AFB terminal. There would be no potential adverse effects to offsite T&E species.

Table 4.5-7 Woody Species of Value to Listed Species in Project Areas

Woody Species of Value to Listed Species	Occurrence in Proposed Areas for Clearing			
	ISR/Strike	Commercial Access Gate	Northwest Field	MSA1
<i>Aglaia mariannensis</i> ^{1,2,3}	X	X	X	X
<i>Artocarpus mariannensis</i> ^{1,2}				X
<i>Carica papaya</i> ²		X		
<i>Cocos nucifera</i> ^{1,2,3}			X	
<i>Elaeocarpus joga</i> ^{1,2,3}		X		X
<i>Eugenia reinwardtiana</i> ¹	X			X
<i>Eugenia thompsonii</i> ¹	X		X	X
<i>Ficus Prolixa</i> ^{1,2,3}	X			X
<i>Guamia mariannae</i> ^{1,3}	X	X	X	X
<i>Guettarda speciosa</i> ²	X			X
<i>Hibiscus tiliaceus</i> ¹	X	X	X	X
<i>Intsia bijuga</i> ^{1,3}	X	X		X
<i>Leucaena leucocephala</i> ¹	X	X	X	X
<i>Macaranga thompsonii</i> ^{1,2}	X			X
<i>Mammea odorata</i> ^{1,2}	X			X
<i>Maytenus thompsonii</i> ²	X			
<i>Neisosperma oppositifolia</i> ^{1,2,3}	X	X	X	X
<i>Pandanus tectorius</i> ^{1,2,3}	X	X	X	X
<i>Pisonia grandis</i> ^{1,2,3}	X			
<i>Premna obtusifolia</i> ^{1,3}	X	X	X	X
<i>Tristiropsis obtusangula</i> ¹	X	X		X
<i>Vitex parviflora</i> ^{1,2}	X	X	X	X

- 1 Foraging or nesting habitat for Mariana crow
2 Foraging or roosting habitat for Mariana fruit bat
3 Nesting habitat for Micronesian kingfisher

Table 4.5-8 Proposed Clearing in Project Areas

Project Area Name	Area of Proposed Clearing (Hectares)	Total Area Cleared as Percentage of Refuge Overlay and Ritidian Unit ¹
ISR/Strike (ASA project area)	66.4	1.48
ISR/Strike (Commercial Gate)	7.5	0.17
Northwest Field Proposed Project Area	47.7	1.06
MSA 1 (Phase I) ²	1.1	0.02
TOTAL	122.7	2.73

- 1 Total area cleared as a percentage is calculated as: The total area subject to clearing divided by the total refuge overlay and Ritidian Unit. The Refuge overlay and Ritidian Unit is 4,480 hectares (11,070 acres). For example, in ISR/Strike ASA Project Area, $(66.4 / 4,480) * 100 = 1.48\%$.
- 2 The planning process for Phase II of the MSA 1 project is very preliminary, and foreseeable implementation of Phase II may not require additional clearing of vegetation in MSA 1.

Cumulative Impacts to Mariana Crows and Mariana Fruit Bats

Construction and training activities associated with the proposed action, Base-wide actions would not be expected to adversely affect Area 50 or the proposed HMU, both of which may present some potential habitat for the Mariana crow, and potential habitat for the re-introduction of the Micronesian kingfisher and the Guam rail. In addition, Base-wide activities would not be expected to adversely affect the ungulate exclosure areas where there are likely to be suitable habitat for Mariana crows, Micronesian kingfishers, and Mariana fruit bats. The ISR/Strike projects include aircraft operations and construction activities near potential nesting sites of the Mariana crow, as well as foraging areas of the Mariana fruit bat. Construction associated with the ASA would impact a known female Mariana fruit bat foraging area. Therefore, clearing for the ASA project would represent an adverse effect. As discussed in Subsection 4.5.1.3, this forest removal would not jeopardize the continued existence of the Mariana fruit bat or adversely modify overall habitat. Noise from ISR/Strike aircraft would be comparable to the noise from aircraft currently operating at Andersen AFB. Therefore, the cumulative impacts of noise on the behavior of the Mariana crow and the Mariana fruit bat would not be expected to change from the current condition.

Cumulative Impacts of Habitat Fragmentation

Construction activities throughout the Base would remove suitable vegetation for listed species. This would have the effect of increasing habitat fragmentation. Habitat fragmentation is the process of converting contiguous vegetation and other resources required by a species into smaller patches or fragments. This process may make some portions of the fragmented area unavailable to the species. For example, some forest species will not cross large open spaces, or will not utilize areas that are near an "edge" of a habitat patch. As the suitable habitat patches become smaller, they will generally support fewer resources required by a particular species, and will overall support fewer species. The Mariana fruit bats are very mobile, and have been known to travel between Rota and Guam, and therefore, would likely travel across disturbed or cleared vegetation patches. Mariana crows are sensitive to human disturbance, but it is not known if they would travel across large open spaces. Nest site fidelity has been observed on both Guam

and Rota when pairs have experienced nest success. A lack of nest fidelity may result from previous unsuccessful nesting attempts. Although some habitat would be removed, the proposed conservation measures within intact forested areas would provide suitable habitat that is protected from ungulate browse pressure, and this habitat around the perimeter of Andersen main and Northwest Field would provide a “corridor” for movement of Mariana crows and Mariana fruit bats to available nesting and foraging areas. Ungulate exclosures as part of the proposed action at Northwest Field and other actions associated with the ISR/Strike capability amount to 200 hectares (494 acres). These exclosure areas are adjacent to the GNWR Ritidian Unit. Management activities within these exclosure units include enhancing foraging habitat for Mariana fruit bats and Mariana crows through outplanting of appropriate species, as well as enacting an ungulate depredation program with eradication of ungulates as a goal.

Construction activities and the associated fragmentation may also affect invasive species. Both deer and pigs are likely to move away from direct human activity (e.g., construction), but may move back to an area shortly after activities cease, to look for new browse areas. Deer and pigs would also transport seeds of invasive plant species. Therefore, after construction, there could be an increase in the number of invasive plants that become established. Because deer and pigs are below the carrying capacity, their numbers may also increase. The full time Wildlife Management Specialist would need to address the areas of construction shortly after activities cease to determine if ungulate population sizes are increasing.

Cumulative Impacts of Conservation Measures

Conservation measures for other actions are described in detail in Subchapter 2.4.2.2. Figure 4.5-2 shows conservation measures on Andersen AFB. The cumulative impacts of

Draft EIS Comment: The Air Force [should] adequately mitigate for the loss of native limestone forest. We recommend that the areas proposed for clearing during the second phase of the MSA Igloo project and areas subject to disturbance associated with training in the Northwest Field and ISR/Strike project (e.g., forest adjacent to the proposed aircraft staging area under the proposed ISR/Strike project) be assessed in the cumulative impacts and appropriately mitigated. active land management practices on 336 hectares.

Response: The planning process for Phase II of the MSA project is very preliminary and is not yet to the point where details are adequate or needed for inclusion in the cumulative impacts analysis of the ISR/Strike EIS. Additionally, as stated in Subchapter 4.5.5, the amount of vegetation subject to clearing is 122.7 hectares. However, conservation measures as part of the ISR/Strike action and other actions would initiate active land management practices on 336 hectares..

conservation measures would be beneficial to the biological resources of northern Guam. Some 336 hectares (830 acres) are proposed for active natural resource management activities, shown in Table 4.5-9. Coupled with ungulate control programs within exclosure areas, the continued degradation of forested areas would be halted. In addition, 10 foraging plots, totaling 2.5 hectares (6.1 acres) within ungulate exclosure areas, are included as conservation measures for the proposed action and other actions. BTS control at Pati Point would directly address the

alarming lack of Mariana fruit bat pups at the Pati Point colony by removing a primary predator. Conservation measures have been designed to enhance recovery efforts of listed species and species habitat.

Table 4.5-9 Cumulative Impacts of Ungulate Removal

Exclosure Area	Area (Hectares)	Management Guidelines
Ungulate exclosure area near Ritidian Point Ritidian East Unit	110 / 272	Ungulate fencing, removal through depredation hunting
Ungulate exclosure area near Ritidian Point Ritidian West Unit	90 / 222	Ungulate fencing, removal through depredation hunting
Ungulate exclosure area east of FTX	54 / 133	Ungulate fencing, removal through depredation hunting
Existing Area 50	22 / 54	Ungulate fencing, removal through depredation hunting. Exotic predator control (BTS, cat, dog, rat) Suitable exotic predator control fencing
Habitat Management Unit	60 / 148	Ungulate fencing, removal through depredation hunting. Exotic predator control (BTS, cat, dog, rat) Suitable exotic predator control fencing
TOTAL	336 / 830	

4.6 GROUNDWATER RESOURCES

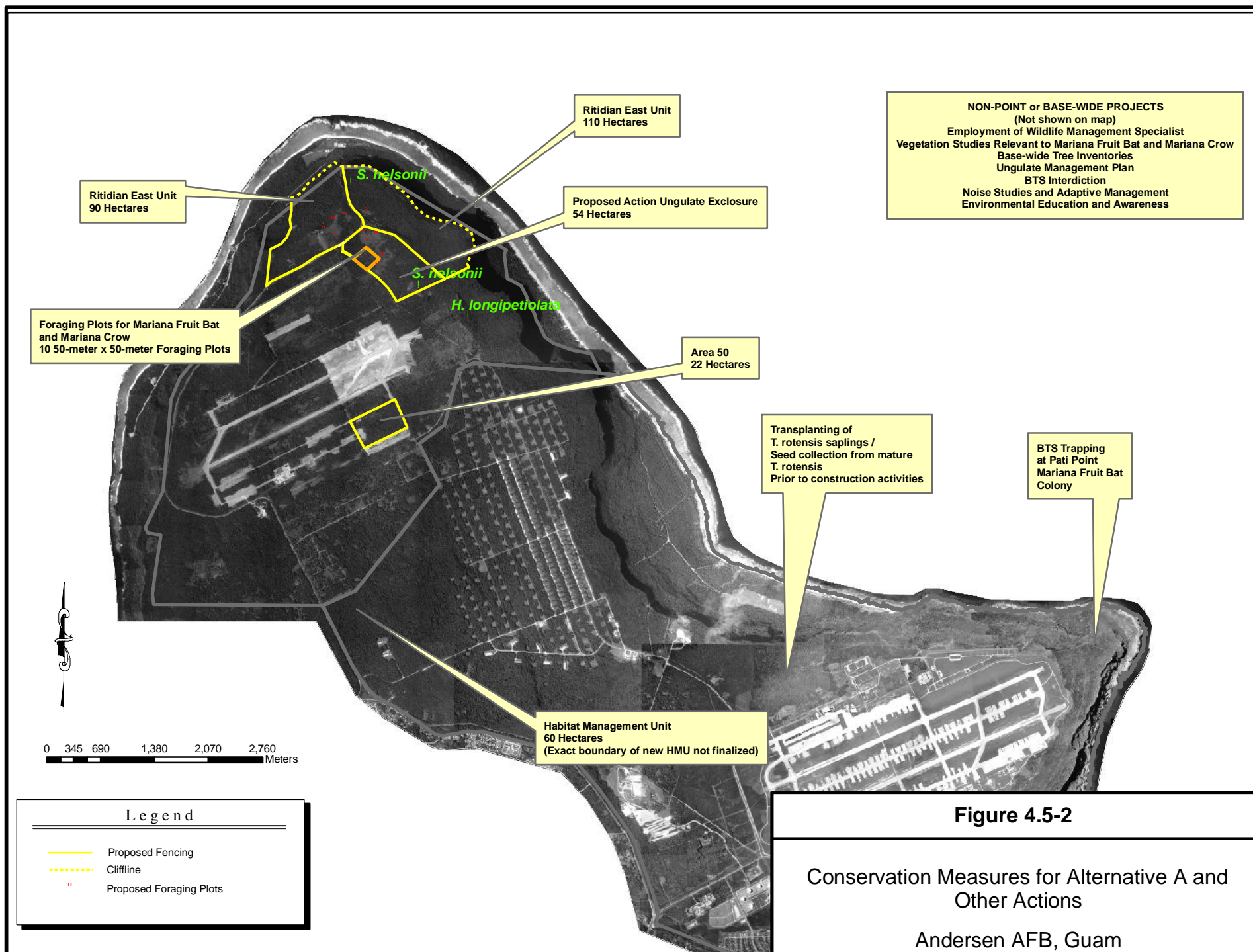
In considering the impacts to groundwater resources, the following evaluation criteria were examined:

- The extent, if any, that the action would impact the groundwater levels, and
- The extent, if any, that the action would cause contamination of groundwater.

4.6.1 Alternative A

Alternative A would increase the Base's population by approximately 3,000 personnel, and aircraft washing activities would increase when compared to the No Action Alternative. The per person water consumption for the additional personnel is projected to be the same as the baseline condition. As a result of Alternative A, average daily water consumption would increase by 0.302 mgd from 0.59 mgd to 0.892 mgd when compared to the No Action Alternative. Assuming the most environmentally extreme condition that water distribution system loss would continue at the baseline rate of 1.91 mgd, the water withdrawal from the aquifer for Alternative A would be 2.802 mgd ($1.91 + 0.892 = 2.802$ mgd), which equates to 6.52 percent of the total 43 mgd of water withdrawn from the aquifer, an increase of 0.71 percent.

The potential for groundwater contamination from Andersen AFB activities would continue be from storm water run-off. However, the potential for storm water contamination and, potentially groundwater, would be minimized through the use of the procedures in the Base's SWPPP. The Base would continue to monitor 12 of the UIC wells twice a year during and after construction is complete to ensure that water entering the wells meets drinking water standards. Base personnel would continue to monitor all construction activity and require an EPP that identifies the actions necessary to reduce or preclude surface contamination from entering the UIC wells.



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4.6.2 Alternative B

Alternative B would increase the Base's population by approximately 1,850 personnel, and aircraft washing activities would increase when compared to the No Action Alternative. When using the factors used for Alternative A analysis, water withdrawal from the aquifer for Alternative B would be 2.687 mgd ($1.91 + 0.777 = 2.687$ mgd), which equates to 6.25 percent of the total 43 mgd of water withdrawn from the aquifer, an increase of 0.44 percent above the No Action Alternative. The erosion control techniques and injection well monitoring discussion to minimize groundwater contamination for Alternative A apply for Alternative B.

4.6.3 No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established at Andersen AFB. The types and level of activities and the number of personnel would remain at baseline conditions. The types and level of activities and the number of personnel (*i.e.*, about 5,900) would remain at baseline conditions. Therefore, water withdrawal from the aquifer for Base activities would remain at approximately 2.5 mgd, which is about 5.81 percent of the daily water withdrawal from the aquifer. The erosion control techniques discussion to minimize ground water contamination for Alternative A apply.

4.6.4 Mitigation

There are no groundwater impacts from either Alternative A or Alternative B that require mitigation.

4.6.5 Cumulative Impacts

Alternative A

Approximately 4,248 additional personnel would be at Andersen AFB under Alternative A and the other actions when compared to the No Action Alternative. When using the factors used for Alternative A analysis, water withdrawal from the aquifer by Andersen AFB would be 2.991 mgd ($1.91 + 1.081 = 2.991$ mgd), which equates to 6.96 percent of the total 43 mgd of water withdrawn from the aquifer, an increase of 1.15 percent above the No Action Alternative. The erosion control techniques and injection well monitoring discussion to minimize groundwater contamination for Alternative A apply.

Alternative B

Approximately 3,098 additional personnel would be at Andersen AFB under Alternative B and the other actions when compared to the No Action Alternative. When using the factors used for Alternative B cumulative analysis, water withdrawal from the aquifer by Andersen AFB would be 2.876 mgd ($1.91 + 0.966 = 2.876$ mgd), which equates to 6.69 percent of the total 43 mgd of water withdrawn from the aquifer, an increase of 0.88 percent above the No Action Alternative. The erosion control techniques discussion to minimize groundwater contamination for Alternative A applies.

4.7 EARTH RESOURCES

The following evaluation criteria were used to assess impacts on earth resources:

- The extent, if any, that the action would have the potential to disrupt geologic features and the locations of facilities in relation to potential geological hazards; and
- The extent, if any, that the action would have on the potential to increase erosion caused by disturbance of the ground surface during training activities and construction and demolition of facilities.

4.7.1 Alternative A

4.7.1.1 Geology and Topography

Proper construction techniques would be used to ensure structural stability of new facilities due to the potential for seismic activity on and in the vicinity of Guam. Ground disturbance associated with construction activity would occur in areas previously disturbed by construction, and no topographic features would be affected.

4.7.1.2 Soil

Soil would be disturbed and vegetation would be removed during construction activities. Major cut and fill efforts would not be necessary for the construction activities. The areas in which facilities would be constructed are relatively flat. Use of the erosion control techniques listed in Subchapter 4.4.2 would minimize the potential for erosion contamination from Alternative A activities.

Clearing and grading activities would require obtaining Guam EPA permits and an Environmental Protection Plan. Stormwater best management practices and erosion control measures would be implemented for construction and post-construction phases. Local government clearances from the Department of Agriculture, Department of Parks and Recreation, and the Historic Preservation Office would be obtained prior to the commencement of earthmoving activities.

4.7.2 Alternative B

Except for the family housing units and family housing management facilities that would not be constructed under Alternative B, the facilities construction and activities are identical to Alternative A. Therefore, the geology, topography, and soil discussion and analysis for Alternative A apply.

4.7.3 No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established at Andersen AFB. The types and level of activities at the Base would remain at baseline conditions. Continued use of the erosion control measures identified in the Base's SWPPP would minimize erosion.

4.7.4 Mitigation

There are no earth resources impacts from either Alternative A or Alternative B that require mitigation.

4.7.5 Cumulative Impacts

The types of construction activities associated with other actions would be almost identical to those for Alternative A. Therefore, the discussion and analysis for Alternative A applies to the cumulative impact analyses, and no cumulative earth resource impacts would occur.

4.8 HAZARDOUS MATERIALS AND WASTE

The following evaluation criteria were used to assess the alternatives with regard to hazardous materials and waste:

- The extent, if any, that the action would require materials that could not be accommodated by existing guidance;
- The extent, if any, that the action would cause waste generation that could not be accommodated by current Andersen AFB waste management capacities; and
- The extent, if any, that the action would interfere with the Andersen AFB IRP.

4.8.1 Alternative A

4.8.1.1 Hazardous Materials

Products containing hazardous materials would be procured and used during the proposed construction and demolition projects. Contractors could use products containing hazardous materials for equipment operation (*e.g.*, hydraulic fluid) during construction activities. Contractors would be required to use and store hazardous materials in accordance with Base procedures. The contractor would be responsible for the storage, treatment, disposal, and transportation off-Guam of any hazardous material that has an expired shelf-life, is out of date, unopened, and/or unused. Overages of hazardous material would not become the burden of the 36th Wing, Andersen AFB, or the DoD.

The aircraft construction materials (*i.e.*, both metal and composite materials), aircraft systems (*i.e.*, hydraulic, electrical, *etc.*), and operations (*i.e.*, mission type) would be the same for the ISR/Strike aircraft and the baseline aircraft. Therefore, it is not likely that any new hazardous materials would be needed to maintain and operate the ISR/Strike aircraft when compared to the baseline. However, it is likely that the procurement of hazardous materials would increase due to the additional 70 aircraft that would operate from Andersen AFB. The existing hazardous materials handling processes and procedures should accommodate the activities associated with ISR/Strike aircraft operation and maintenance. However, the hazardous materials handling processes and procedures would be updated should a hazardous material be required for the ISR/Strike operations that was not previously used. Hazardous materials to be used for maintenance at Andersen AFB facilities would be coordinated and approved by the Hazardous Materials Pharmacy.

4.8.1.2 Hazardous Waste

Under Alternative A, hazardous waste would be generated during construction and demolition activities. Construction contractors would manage hazardous waste in accordance with Base, local, and federal guidance, and would be responsible for storage, treatment, disposal, and the off-Guam transportation of any hazardous waste. Hazardous waste would not become

the burden of the 36th Wing, Andersen AFB, or the DoD. Additionally, construction contractors would obtain their own USEPA generator identification number. It is expected the quantity of waste would be negligible and limited to equipment maintenance products. Any hazardous waste generated would be handled in accordance with federal and local laws and regulations, including Resource Conservation and Recovery Act (RCRA) requirements, for waste management and USDOT requirements for waste transport, and would be coordinated with the Andersen AFB Environmental Flight.

In the event of a spill of any amount or type of hazardous material or waste (petroleum products included), the construction contractor would take immediate action to contain and clean up the spill in accordance with the Base's Spill Prevention, Control, and Countermeasures Plan. The contractor would accomplish required documentation procedures and notify the Andersen AFB Fire Department and the Base Environmental Flight for reporting to regulatory agencies. Contractor spill cleanup personnel would be trained and certified to perform spill cleanup. The contractor would be responsible for proper characterization and disposal of any spilled waste and cleanup materials. All waste and associated cleanup material would be removed from the project site and transported and/or stored in accordance with regulations until final disposal. Fueling and lubrication of equipment would be conducted in a manner that affords maximum protection against spills. Secondary containment is required for transformers, tank trucks, and containers with a capacity of 55 gallons or more.

Should construction projects occur near known IRP sites, the construction contractor would be responsible for impacted soil. Should impacted soil be removed from the construction site, the construction contractor would be responsible for sampling and characterization of the soil prior to disposal to determine the proper disposal and transportation management methods. Soil that meets hazardous criteria must be managed in accordance with applicable federal requirements, including proper disposal, treatment (if necessary), and transportation. The safe and proper handling of the impacted soil should be coordinated with the Base Environmental Flight and Bioenvironmental Engineering to prepare a work plan and health and safety plan in the event contamination is encountered during excavation activities.

Hazardous waste generated by ISR/Strike aircraft O&M activities would be similar in nature with the baseline condition waste streams from existing activities at Andersen AFB. The primary waste-producing processes would continue to include aircraft parts cleaning, fluid changes for routine aircraft and vehicle maintenance, aircraft corrosion control, facility, and infrastructure maintenance. Any hazardous waste generated would be handled in accordance with federal, state, and local laws and regulations, including RCRA requirements for waste management and USDOT requirements for waste transport. It is possible that hazardous wastes could be sent off-island disposal so as to minimize any impacts and the waste could not be accommodated on-island.

The aircraft construction materials (*i.e.*, both metal and composite materials), aircraft systems (*i.e.*, hydraulic, electrical, *etc.*), and operations (*i.e.*, mission type) would be the same for the ISR/Strike aircraft and the baseline aircraft. Therefore, it is not likely that any new hazardous waste streams would occur from the maintenance and operation of ISR/Strike aircraft when compared to the baseline. The existing hazardous waste management processes and procedures should accommodate the waste generated under Alternative A. Andersen AFB personnel estimate hazardous waste generation could increase from the current 12,000 pounds

per year to about 22,000 pounds per year with the addition of ISR/Strike aircraft. The Base would increase the 90-day waste storage capacity to accommodate the additional hazardous waste. Andersen AFB would revise its existing *Hazardous Waste Management Plan* to incorporate activities of the ISR/Strike capability.

4.8.1.3 Installation Restoration Program

Construction under Alternative A would occur in and around land which currently comprises an IRP site, former AOCs requiring no further action, SWMUs, and other possibly contaminated areas. Under Alternative A, numerous structures would be constructed and roadways, taxiways, and parking areas would either be constructed or repaved. Trenching and construction activities under the No Action Alternative may take place in or around sites that have soil contaminated with sanitary trash, waste chemicals, metals debris, pesticides, construction debris, semi-volatile organic compounds, UXO, asphaltic waste, dioxins, polychlorinated biphenyls, and fuel-related constituents.

A review of Figure C-1 in Appendix C, which shows the locations of the IRP sites, former AOCs requiring no further action, SWMUs, and other sites, and Figure 2.2-4, which shows the proposed locations of the construction projects, reveals that many of the IRP sites are near some of the proposed construction projects. These construction projects would not be impacted by the IRP sites, former AOCs requiring no further action, SWMUs, or other sites because most of them are storage areas within a defined space and would not be impacted by the individual construction activities of these projects.

There is a possibility of construction personnel coming into contact with contaminants of concern and UXO. The Base Explosives Ordnance Disposal (EOD) has the responsibility for the proper handling and disposal of UXO discovered during current and future investigations and at construction sites. The contractors would be advised to stop work and contact the Base EOD and other appropriate Air Force project personnel if UXO is encountered or if there was any suspicion of a hazardous condition during construction activities. The construction contractor would coordinate with the Base Environmental Flight and Bioenvironmental Engineering prior to handling and disposing any IRP-related material at a MILCON site, including a site that is built on top of a known IRP or military munitions response site that has not been completed under the remedial action process. MILCON projects must not hinder access to current IRP sites, IRP sites with Land Use Controls, former AOCs requiring no further action, other contaminated areas, monitoring wells, and remedial systems for sampling and operation and maintenance activities.

Facilities design and construction would be coordinated with the Base Environmental Flight and Bioenvironmental Engineering to ensure that MILCON would avoid interference with ongoing investigations, remediation work, and land use controls, and would not worsen the condition or impair the ability to remediate any site. Before construction activities begin, the contractor would be required to coordinate with the Base Environmental Flight and Bioenvironmental Engineering to prepare a work plan and health and safety plan in the event contamination is encountered during excavation activities. The work plan and health and safety plan would address measures for using field instruments capable of detecting contaminants at harmful levels. Soil gas associated with contamination could enter the building at levels that could present a long-term health risk. For this reason, buildings to be constructed over any

contaminated land would be designed to include a subterranean vapor barrier, closed barrier seams, and a passive vent system.

4.8.1.4 Stored Fuel

Petroleum products that would be used under Alternative A are identical in nature to those used by the current aircraft activities at Andersen AFB. Fueling and equipment lubrication activities would be conducted in a manner that affords maximum protection against spills. Based on average sortie duration rates and average jet fuel consumption per flying hour for each of the ISR/Strike aircraft, it is estimated that an additional 21,157,806 gallons per year would be dispensed for Alternative A aircraft operations. Jet fuel consumption could increase from the approximate 2,200,000 gallons of fuel dispensed under the No Action Alternative to 23,357,806 gallons annually, or 63,995 gpd. Assuming the storage tanks are full each day (*i.e.*, 66,000,000 gallons), the average daily jet fuel consumption would equate to about 0.1 percent of the Base's fuel storage capacity. The increase in fuel consumption could require additional deliveries. Fuel would continue to be managed using the existing procedures.

4.8.2 Alternative B

Except for the construction projects that would not be constructed under Alternative B (see Subchapter 2.2.2) and the slight reduction in KC-135 flying time (*i.e.*, the time associated with fewer closed pattern operations), the types and levels of activities that would occur under Alternative B would be the same as Alternative A. Therefore, the discussion and analysis for hazardous material, hazardous waste, IRP, and stored fuel for Alternative A apply to Alternative B.

4.8.3 No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established at Andersen AFB. The activities and operations that occur under the existing, baseline condition would continue at the Base. Construction and demolition activities associated with individually programmed facility actions and O&M activities would continue to occur. The number of Air Force active duty and civilian personnel, as well as contractor personnel at the Base, would remain at the September 2004 levels (*i.e.*, approximately 5,900 personnel).

4.8.3.1 Hazardous Material

Under the No Action Alternative, hazardous material would continue to be managed by the Base's Hazardous Materials Pharmacy. Contractors and Base personnel working on routine MILCON projects would follow the Base's Hazardous Materials Management program established by AFI 32-7086. The construction and demolition activities for the No Action Alternative would be similar to the Alternative A activities. Therefore, the discussion and analysis for Alternative A apply.

4.8.3.2 Hazardous Waste

Under the No Action Alternative, hazardous waste would continue to be generated during routine Base activities. The hazardous waste management, spill containment and clean up, and contaminated soil procedures mentioned for Alternative A apply to the No Action Alternative.

Hazardous waste from recurring aircraft and vehicle maintenance activities would continue to be handled in accordance with existing Base management plans.

4.8.3.3 Installation Restoration Program

Under the No Action Alternative, MILCON may occur in and around land currently comprising an IRP site, former AOCs requiring no further action, SWMUs, and other possibly contaminated areas. Remedial investigations and clean-up efforts would continue under the Base's IRP. Trenching and construction activities under the No Action Alternative may take place in or around sites that have soil contaminated with sanitary trash, waste chemicals, metals debris, pesticides, construction debris, semi-volatile organic compounds, UXO, asphaltic waste, dioxins, polychlorinated biphenyls, and fuel-related constituents. The discussion and analysis for Alternative A apply due to the similarities of the construction projects of the No Action Alternative.

4.8.3.4 Stored Fuel

The primarily used petroleum product would continue to be jet fuel. The Base would continue to have storage capacity of 66,000,000 gallons and dispense about 2.2 million gallons of jet fuel annually, which equates to 65,000 gallons daily and 0.01 percent of the storage capacity.

4.8.4 Mitigation

There are no hazardous material, hazardous waste, IRP, or stored fuel impacts from either Alternative A or Alternative B that require mitigation.

4.8.5 Cumulative Impacts

The construction contractor for other action projects would be required to comply with the regulatory requirements identified for the Andersen AFB No Action Alternative and Alternative A. Some of the other actions would be adjacent to an Alternative A or Alternative B project site. Use of the requirements identified for the No Action Alternative and Alternative A would minimize the potential for cumulative impacts. When completed, activities at the other facilities would be managed in accordance with applicable environmental plans and policies. No cumulative hazardous material, hazardous waste, IRP, or stored fuel impacts would occur if either Alternative A or Alternative B would be implemented.

4.9 CULTURAL RESOURCES

The effects of an action on cultural resources would be considered significant if activities and undertakings would directly or indirectly effect cultural resources. The nature and potential significance of cultural resources in the APE were identified by considering the following definition. Historic resources, under 36 CFR Part 800, are defined as "...any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP." For the purposes of these regulations, this term includes artifacts, records, and remains related to and located within such properties. The term "eligible for inclusion in the National Register" includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet NRHP listing criteria. Therefore, sites not yet evaluated are

considered potentially eligible for inclusion in the NRHP and, as such, are afforded the same regulatory consideration as nominated properties.

The Air Force is required to comply with federal historic preservation statutes and regulations that apply to cultural resource management. These requirements include: compliance with Sections 106 and 110 of the NHPA; compliance with the Archaeological Resources Protection Act, Standards for Archaeology, History and Architecture (36 CFR 61.9); and the Secretary of the Interior's Guidelines for Archaeological Documentation (48 CFR 44720).

The Air Force is required to protect cultural resources listed or eligible for listing on the NRHP. Federal agencies are required under Section 106 of the NHPA of 1966, as amended, to exercise stewardship over historic resources under its ownership, encourage preservation of such properties controlled by others, and consider the effects of its actions on such properties. Under Section 110(s)(2) of the NHPA and as directed by a Presidential EO promulgated in March 2003, federal agencies are required to locate, inventory, and nominate the NRHP eligible properties under their control as part of a comprehensive effort in cultural resource management (Andersen AFB 2003c).

The criteria of effects from Section 106 of the NHPA are used to evaluate the potential for adverse effects on cultural resources. Any action that could change in any way the characteristics that qualify the property for inclusion in the NRHP, for better or for worse, is considered to have an "effect." If the action could diminish the integrity of such characteristics, it is considered to have an "adverse effect." Effects may occur at the same time and place as the undertaking or at a later time and distance from the location of the undertaking. For example, construction of a new roadway may cause or accelerate changes in land use or traffic patterns in other areas; these changes are potential effects of the action and are referred to as indirect effects.

Criteria of Effect. Section 800.9(a) of the NHPA states that an undertaking has an effect on a historic resource when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the NRHP. For the purpose of determining effect, alteration to features of a property's location, setting, or use may be relevant depending on the property's significant characteristics and should be considered.

Criteria of Adverse Effect. Section 800.9(b) of the NHPA states that an undertaking is considered to have an adverse effect when the effect on a historic resource may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic resources include, but are not limited to:

- Physical destruction, damage, or alteration of all or part of the property;
- Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for inclusion on the NRHP;
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or which alter its setting;
- Neglect of the property resulting in its deterioration or destruction; and
- Transfer, lease, or sale of the property.

Exceptions to the criteria of adverse effects are considered when:

- The research value of a property can be substantially preserved through research conducted with applicable professional standards and guidelines;
- When the undertaking is limited to rehabilitation of buildings and structures conducted in a manner that preserves historical and architectural values through conformance with the Secretary of the Interior's standards for rehabilitation; and
- When the undertaking is limited to the transfer, lease, or sale of a historic resource and adequate restrictions or conditions are included to ensure preservation of significant historic features.

4.9.1 Alternative A

Alternative A would result in construction activities in areas that have not been surveyed for archaeological resources. Six of the construction projects associated with the proposed actions related to establishment of the ISR/Strike capability would be located in areas not previously surveyed: 190 family housing units, the Tactical Missile Maintenance Facility, Conventional Missile Maintenance Facility, Armament Systems Shop (Building 51104), new Commercial Gate, and expansion of the landfill. Any construction projects within CRMA IV would occur in an area that has not been subject to archaeological survey. Alternative A could result in a greater potential for impacts for undiscovered cultural resources than the No Action Alternative.

While Alternative A would not result in any effects to historic buildings listed on the NRHP, there are construction projects that would occur within the boundaries of historic site 66-07-1064 (North Field). The North Field historic site has been recommended as eligible for listing on the NRHP, and comprises the airfield complex within the main Base. Construction projects that would be located within the historic North Field complex are:

- Clean Water Rinse Facility;
- Mooring and Grounding Points;
- Repair of Taxiway Bravo, Taxiway Foxtrot, and Taxiway Charlie;
- Repair of the South Runway;
- Repair of Taxiway D; and
- Arm/Disarm Pads/End of Runway Shelter.

Because the historic North Field is eligible for listing on the NRHP, construction activities within this area would be subject to stipulations to be developed during the Section 106 consultation process that has been initiated (see Appendix D). It has been recommended that NRHP nomination forms prepared in 1975 for this property be completed and submitted by the Air Force (Andersen AFB 2003a). Figure 3.9-2 shows the historic North Field.

Facilities to be constructed in the Andersen main base would primarily be within existing development, an area heavily impacted by past Air Force construction and buildup. This area is within CRMA III. This CRMA is unlikely to contain surface or subsurface cultural resources deposits. As recommended in the ICRMP, cultural resource management should continue interpretation and commemorative programs.

Construction in open space areas would be required for the Tactical Missile Maintenance Facility, Conventional Missile Maintenance Facility, Sports Field Complex, Commercial Gate, expansion of the landfill, and military family housing warehouse. Because the final siting of new buildings has not been determined or may be subject to change, and because new facilities may be constructed in unsurveyed areas within any of the three CRMAs, the potential for encountering cultural resources is considered to be generally high. Two of the three CRMAs have not been systematically surveyed for archaeological resources, and the potential for unearthing of artifact scatter from pre- and post-Contact periods exists. Any disturbance or loss of cultural resources would be considered an adverse effect.

Alternative A would include building alteration projects; however, demolition of existing buildings is not planned at this time. Alternative A would not affect any of the seven buildings previously evaluated and recommended for the NRHP.

Construction within historic North Field, and within any of the areas not previously surveyed, may result in an adverse effect upon historic resources and/or archaeological sites. The loss of historic structures on Andersen AFB would be an adverse effect because this undertaking would result in the permanent removal of characteristics of a historic resource that may qualify for inclusion on the NRHP. Loss of historic resources would be irreplaceable. Loss of archeological material could result loss of information important in prehistory or history. In addition, reasonably foreseeable effects of the undertaking may occur later in time or farther removed by distance.

Two of the three CRMAs in the proposed ISR/Strike project area were previously recommended for archaeological inventory, ethnographic survey, and Section 106 review if a planned project would affect archaeological properties. Pursuant to Section 106 consultation with the GSHPO in October 2005, it was determined that in addition to known cultural resources, an unknown number of potential cultural resources could be adversely effected by planned construction activities in the area north of the airfield where the ASA is proposed.

Cultural resource inventories were conducted in the proposed APE (*i.e.* ASA) between May and August 2006. This effort located 34 previously unrecorded prehistoric sties and four previously undocumented historic foundations. The prehistoric sites are primarily scatters of Latte Period ceramic sherds and lack vertical stratification or habitation features. The historic resources appear to represent MILCON activities spanning roughly the years 1945-1955. An Executive Summary for Cultural Resources Inventory was submitted to the GSHPO on September 6, 2006. Based on review of the Executive Summary, the GSHPO responded in an October 3, 2006 letter (see Appendix D) that “further archaeological investigation on prehistoric sites at ISR/Strike will not provide any new information about the project area, but such an investigation will only be redundant to what we already know about the project.” This letter from the GSHPO concluded Section 106 consultation.

Should historic resources or archaeological resources be discovered during project activities, work in the immediate area would be suspended and the Andersen AFB Environmental Flight would consult the GSHPO. Subsequent actions would follow guidance provided in 36 CFR 800 and other relevant laws, regulations, and standard operating procedures outlined in the ICRMP.

4.9.2 Alternative B

Except for the family housing units and family housing management facilities that would not be constructed under Alternative B, the alternative facilities construction and activities are identical to Alternative A. Therefore, the discussion and analysis for Alternative A apply to Alternative B.

4.9.3 No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established at Andersen AFB. There would be no construction associated with the ISR/Strike project on Andersen AFB. The activities that occur under the baseline conditions would continue. Cultural resources on Andersen AFB would continue to be managed in accordance with procedures defined in the ICRMP. Therefore, the No Action Alternative would have no adverse effect on cultural resources.

4.9.4 Mitigation

As described in Subchapters 1.2.5 and 4.9.1, the Air Force accomplished Section 106 consultation with the GSHPO. No mitigation was identified as a result of the process.

4.9.5 Cumulative Impacts

The ISR/Strike project is one of a number of other planned projects involving construction on Andersen AFB. The potential for cumulative impacts from the ISR/Strike and other actions is minimal based on the distance between project sites, especially for the Northwest Field project. Additionally, the Air Force accomplished the Section 106 process for the Northwest Field project. The potential for cumulative impacts between the ISR/Strike projects and other projects would be prevented or minimized through implementation of the procedures identified in the Andersen AFB ICRMP. When combining the other actions with implementation of the ISR/Strike project through the consultation process, no cumulative adverse effects on significant cultural resources, including visual resources, would occur.

4.10 SOCIOECONOMIC RESOURCES

The DoD standard (O&M) and construction models of the USACE Economic Impact Forecast System (EIFS) were used to forecast impacts of Alternative A. The standard model estimates the impacts of ongoing mission and operations as well as assessment of changes in operations. The construction model predicts the economic impacts of the expenditures and employment from construction activities. Using a technique termed the rational threshold value (RTV), EIFS estimates are compared to historic trends for each economic indicator (business volume [using non-farm income], personal income, employment, and population) to determine impacts. The RTV model analyzes annual changes since 1969, and establishes analysis criteria based on historic deviations in the value of these four socioeconomic indicators. The EIFS calculates both positive and negative RTVs. This assessment assumes impacts would occur within the area surrounding the Base. The evaluation criteria using the socioeconomic analysis include:

- The extent, if any, that the existing housing, education, and economic sectors would accommodate the population, housing, education, and economic changes resulting from the action; and
- The extent, if any, that the economic and social effects would cause an adverse impact to the human environment. The human environment is defined by the CEQ 1508.14 as impacts on the natural and physical environment (air, water, and ecosystems).

4.10.1 Alternative A

4.10.1.1 Population

Under Alternative A, there would be an overall increase of 3,000 personnel and dependents. It is assumed that all military personnel and dependents would reside on Andersen AFB, while the few civilian contracting personnel would reside off-Base. Under Alternative A the on-Base full-time equivalent population would increase by approximately 51 percent when compared to the No Action Alternative.

The off-Base population would temporarily increase for the duration of the construction activities. The increase would result from U.S. skilled workers who would temporarily relocate to Guam to augment the relatively small number of construction workers available on Guam. Approximately 80 percent of the required construction workers would be from elsewhere in the U.S.; which translates to 1,800 or more temporary U.S. workers.

The increase in required construction workload may require deliberate efforts to increase the supply of skilled construction workers available on Guam, depending on available funding and the pace and intensity of authorized construction projects.

Currently, federal law prohibits the use of alien labor present on Guam under temporary, non-immigrant worker visas (so-called “H-2” workers) to be employed on federal construction contracts or base services contracts awarded under Office of Management and Budget Circular A-76 outsourcing and privatization procedures. Use of non-immigrant alien labor for military construction projects on Guam would require either a change in current law or use of limited waiver provisions available in the current law.

4.10.1.2 Housing

Construction of 190 family housing units in conjunction with use of the 250 vacant on-Base family housing units would accommodate the need for 450 additional family housing units generated by Alternative A. New dormitory spaces would also be constructed to accommodate the additional demand for unaccompanied military personnel. The dormitory construction and family housing renovation and construction projects would occur on a phased schedule that mirrors the increases in the number of personnel.

Housing to accommodate temporary skilled U.S. workers would be required during the 16-year construction period. This housing would be located outside the Base. Three types of housing, identified and discussed in the following paragraphs, are likely to be utilized to accommodate these workers. It is likely that a combination of two or more of these types would be used to provide the increased need in housing. Use of these three types of housing occurred during the high level of construction activity in the early 1990s.

The current vacant traditional housing supply on Guam consists of a mixture of single-family homes, apartments, townhouses, duplexes, triplexes and condominiums. The April 2005 Guam Multiple Listing Service listed approximately 250 housing units for sale and 240 units for rent. Most temporary workers would rent rather than purchase housing during their temporary residency on Guam. Although the current supply of vacant lower-priced rental units is less than the potential demand, some of the housing units listed for sale would be moved into the rental market by the current or new owners, as occurred during the early 1990s. The demand by temporary U.S. workers for rental housing would provide incentive for landlords to renovate and cleanup many unused dwellings. The impact on the existing infrastructure that would occur from occupation of these housing units generally has been previously addressed during permitting of these housing units.

Underutilized guest type lodging (*i.e.*, hotels, motels, vacation apartments, and condominiums) would be another potential source of housing. This type of lodging may include: existing hotels willing to rent at rates appropriate for long term occupancy; hotels that would convert all or in part to long term rental operation (such as the Tumon Horizon did in the early 1990s); and vacant hotels requiring repair/renovation prior to occupancy. It is unknown how many such units could be provided. The impact on existing infrastructure was addressed during permitting and design of these types of units.

Another alternative is construction of new and/or renovation of existing temporary housing facilities dedicated to use by the temporary skilled workers. Historically, establishment and operation of such housing has been undertaken by the construction contracting companies, and has been used by nonimmigrant alien workers, sometimes referred to as H-2 workers. These workers are prohibited by Federal law from working on military construction projects on Guam.

One or more of these temporary housing types may be required to house workers not otherwise accommodated by the previous two types of housing. Use of existing temporary housing facilities would be advantageous because the infrastructure (*i.e.*, roads, wastewater, and water) would be in place. However, these systems may require significant renovation and upgrade to be used by temporary U.S. workers. New temporary housing facilities would require evaluation for siting, infrastructure, access, availability of non-work transportation. This type of housing could include prefabricated structures that could be shipped in “knock-down” condition. (Fully constructed or pre-constructed housing [“mobile homes”] would not likely be a viable option due to size of and cost of shipping.)

Many of the existing temporary housing facilities are in the northern municipalities of Yigo and Dededo and relatively close to Andersen AFB. Yigo and Dededo may be a preferred location for temporary housing that may be constructed or imported (“knock-down” structures) because of their proximity to the Base and the established infrastructure.

The use of temporary housing facilities for skilled U.S. workers would require detailed evaluation of required capacity, schedule of the requirements, options of the above and other possible housing types, and impact on existing infrastructure. These and other issues would be the responsibility of construction contractor(s), and would have to be identified and evaluated on accurate information at such time as these types of housing would be required.

Another alternative that has been utilized in other locations would house workers in waterborne vessels. This alternative would have to be fully evaluated by the construction contracting company(s).

4.10.1.3 Education

Under Alternative A, there would be an increase in school enrollment due to the increase in the number of military personnel and dependents. The majority of this enrollment increase would occur in the DoDEA schools on Andersen AFB. This enrollment increase would approximate 525-550 new students, including an estimated 100-110 high school students when compared to the No Action Alternative.

The current enrollment of the DoDEA Andersen Elementary/Middle Schools is 1,300 students, with an enrollment capacity of 1,522 students. The majority of this current excess capacity is at Andersen Elementary, while Andersen Middle School is near capacity. The addition of as many as 440 elementary/middle school students to the existing enrollment would expand the student population to about 1,740 students, exceeding the capacity by about 218 students. The current enrollment of the DoDEA Guam High School is 435 students, with an enrollment capacity of 450 students. The addition of as many as 110 high school students to the existing enrollment would expand the student population to about 545 students, exceeding the capacity by about 95 students.

One of the ISR/Strike projects would construct a DoDEA high school, which would accommodate additional high school students. Vacated space in the existing high school could be used to accommodate the additional elementary/middle school students. Should additional space be needed, portable buildings similar to those used by public school districts could be used to alleviate overcrowding.

Enhanced government workforce training programs, private sector apprenticeship training programs, migration of skilled workers from the mainland United States or Hawaii, and migration of workers from the nearby freely associated Micronesian nations may be necessary to meet possible additional labor requirements.

4.10.1.4 Economy

Direct and indirect short-term beneficial economic impacts to the Guam economy would be realized during the construction associated with Alternative A. Employment generated by construction activities would result in wages paid, increases in business sales volume, and increased demand for local and regional services, materials, and supplies. In addition, there would be direct and indirect long-term beneficial economic impacts due to the expanded operations associated with Alternative A that would not occur under the No Action Alternative.

The EIFS model provides a systematic method for evaluating the short-term and long-term regional socioeconomic effects of government actions, particularly military actions. The primary EIFS model inputs for construction impacts are the estimated construction cost (capital costs) for project implementation, and annual average income for construction workers. In addition, the extent of the use of skilled U.S. workers from elsewhere in the U.S. is included as a model input. The estimated construction cost for the projects is pro-rated over the 16-year construction period.

to estimate annual economic impacts. The economic Region of Influence is considered to be the Island of Guam. The calculated multiplier for Guam is 2.2374.

Long-term beneficial economic benefits of Alternative A would be realized as a result of the increase of approximately 1,050 full-time equivalent military and civilian employees during operations. The primary inputs for the EIFS operations model are an increase in estimated annual operating expenditures; estimated increase of full-time equivalent military and civilian employees; and, annual average incomes of \$28,000 and \$40,000, respectively, for the new military and civilian employees.

The EIFS model uses employment and income multipliers developed with a comprehensive regional/local database combined with economic export base techniques to estimate the regional economic impacts of changes in employment generated and expenditures directly and indirectly resulting from project construction. The EIFS model evaluates the economic impacts of regional change in sales (business) volume, employment and personal income. Since the EIFS model does not include a database for Guam, a database was constructed to assess annual impacts. This database consists of time series data on employment, income, and business sales receipts. The 2002 Economic Census of Guam and the Guam Economic Report, Wage and Salary Earnings (2003), were the main sources of information for developing this database.

As indicated in Table 4.10-1, direct annual regional economic impacts would occur as a result of operations under Alternative A. There would be an increase of 1,262 employees in the government, retail trade, services, and industrial sectors, which would increase the regional economy by \$23.1 million in business volume (sales) and result in \$33.5 million in direct personal income when compared to the No Action Alternative. Employment and income of the 1,050 full-time equivalent military personnel are included in the direct employment and direct income. The direct income represents the earnings of employees in the government, retail, wholesale and service establishments that would be initially or directly affected by the net gain of military and civilian employees. The increase in business volume reflects increases in the sales of goods, services, and supplies to the military and civilian personnel, and other employment directly associated with project operations.

Table 4.10-1 shows the indirect annual regional impacts on secondary sales, employment, and income generated by the employment and business activity directly associated with the expanded operations. The direct increase in sales and employment generates increases in secondary sales of \$28.6 million; the gain of an additional 262 jobs indirectly in the retail trade, services and industry sectors; and a gain of an additional \$5.0 million in indirect income when compared to the No Action Alternative. Income is indirectly impacted as a result of the increase in sales and employment resulting from the initial economic impacts.

Table 4.10-1 shows the direct annual regional economic impacts of project construction over this 16-year period under Alternative A. These direct construction impacts would include increases of \$339.6 million in business volume (sales); the addition of 2,752 jobs in the construction, retail trade, services and industrial sectors; and include increases of \$84.8 million in direct personal income when compared to the No Action Alternative. Direct employment includes those workers who would accomplish the construction activities associated with Alternative A. Personal income represents the earnings of employees in the construction, retail, wholesale, and service establishments who would be initially or directly affected by the

construction activity. The increase in business volume includes the sales of goods, services, and supplies associated with project construction activity.

Table 4.10-1 shows that the indirect economic impacts during the 16-year construction period include secondary sales of \$67.8 million and an additional 621 jobs indirectly in the retail trade, services, and industry sectors. This results in an additional \$12 million in indirect income above the No Action Alternative. Income is indirectly impacted as a result of the indirect increase in sales and employment resulting from the initial economic impacts.

Table 4.10-1 Annual Alternative A Economic Impacts

	Direct Impacts	Indirect Impacts	Total
Annual Operations Impacts			
Sales (Business) Volume	\$23,122,947	\$28,613,476	\$51,736,423
Income	\$33,500,653	\$ 5,074,350	\$38,575,003
Employment	1,262	262	1,524
Annual Construction Impacts¹			
Sales (Business) Volume	\$ 339,648,917	\$67,864,394	\$ 407,513,311
Income	\$ 84,790,884	\$12,035,158	\$ 96,826,042
Employment	2,752	621	3,373

¹Annual impacts only during the 16-year construction period.

Source: EIFS.

The EIFS model also includes an RTV profile used in conjunction with the forecast models to assess the significance of impacts of an activity for a specific geographic area. For each variable (sales volume, employment, income, and population), the current time-series data available from the U.S. Department of Commerce (USDOC) Bureau of Economic Analysis (USDOC 2000; 2001) are calculated along with the annual change, deviation from the average annual change, and the percent deviation for each of these variables, which then defines a threshold for significant annual regional economic impacts for a variable. Within the EIFS model, the RTV is calculated for each of these variables when assessing the regional economic impacts of a specific project. If the RTV for a particular variable associated with the impacts of a specific project exceeds the maximum annual historic deviation for that variable, then the economic impacts would be considered significant. If the RTV for a variable is less than the maximum annual historic deviation for that variable, then the regional economic impacts would not be considered significant. With respect to the EIFS model assessment of the economic impacts of construction under Alternative A, the RTVs for annual sales volume and income exceed the respective regional RTVs. In respect to the additional annual operations, the RTVs for each of the three variables (sales volume, income, and employment) were found to be significantly less than the regional RTVs. Thus, project construction would result in significant annual economic impacts on Guam during the construction period, while the expanded operations under Alternative A would not result in significant annual economic impacts on Guam.

The Guam economy would also realize additional economic benefits from the receipt of income taxes on wages received by the construction workers and new permanent based population. The citizens and residents of Guam, including military personnel, pay federal income taxes to the Guam Treasury rather than the U.S. Treasury. The U.S. Congress created

the Territorial Government of Guam as a separate taxing jurisdiction by enactment in 1950 of the Organic Act of Guam. Section 31 of the Act provides that the income tax laws in force in the United States shall be the income tax laws of Guam, substituting Guam for the United States where necessary and omitting any inapplicable or incompatible provisions. The U.S. Internal Revenue Code with such changes constitutes the Guam Territorial Income Tax Law. Assuming a 15 percent effective tax bracket, the Guam Treasury could receive between \$2-3 million annually from the additional new military and civilian personnel at Andersen AFB when compared to the No Action Alternative.

Other potential income for the Guam Treasury would be realized from the Gross Receipts Tax levied on businesses. This tax, which is 4 percent, is included in the sales price of consumer goods and services, and is paid by the business establishment. Additional tax revenues from gasoline, alcoholic beverage, and tobacco taxes could also be realized when compared to the No Action Alternative. Since there is no sales tax on consumer goods in Guam, no additional revenue would be realized from this source.

4.10.2 Alternative B

4.10.2.1 Population

Under Alternative B, there would be an overall increase of 1,850 personnel and dependents. It is assumed that all military personnel and dependents would reside on Andersen AFB, while the few civilian contracting personnel would reside off-Base. Under Alternative B the on-Base population full-time equivalent population would increase by approximately 31 percent when compared to the No Action Alternative.

The off-Base population would temporarily increase for the duration of the construction activities. The increase would result from U.S. skilled workers who would temporarily relocate to Guam to augment the relatively small number of construction workers available on Guam. Approximately 80 percent of the required construction workers would be from elsewhere in the U.S.; which translates to 1,600 or more temporary U.S. workers.

4.10.2.2 Housing

Use of the 250 vacant on-Base family housing units would accommodate the need for the 100 additional family housing units generated by Alternative B. New dormitory spaces would be constructed to accommodate the additional demand for unaccompanied military personnel. The off-Base housing discussion for skilled workers from elsewhere in the U.S. in Alternative A applies.

4.10.2.3 Education

Under Alternative B, there would be an increase in school enrollment due to the increase in the number of military personnel and dependents. The majority of this enrollment increase would occur in the DoDEA schools on Andersen AFB. This enrollment increase would approximate 80-90 new students, including an estimated 15-20 high school students when compared to the No Action Alternative.

The current enrollment of the DoDEA Andersen Elementary/Middle Schools is 1,300 students, with an enrollment capacity of 1,522 students. The majority of this current excess capacity is at Andersen Elementary, while Andersen Middle School is near capacity. The addition of as many as 70 elementary/middle school students to the existing enrollment would expand the student population to about 1,370 students, leaving an excess capacity of about 152 students. The current enrollment of the DoDEA Guam High School is 435 students, with an enrollment capacity of 450 students. The addition of as many as 20 high school students to the existing enrollment would expand the student population to about 455 students, exceeding the capacity by about five students. One of the ISR/Strike projects would construct a DoDEA high school, which would accommodate the additional high school students.

4.10.2.4 Economy

Direct and indirect short-term beneficial economic impacts to the Guam economy would be realized during the construction associated with Alternative B. Employment generated by construction activities would result in wages paid, increases in business sales volume, and increased demand for local and regional services, materials, and supplies. In addition, there would be direct and indirect long-term beneficial economic impacts due to the expanded operations associated with this alternative. The EIFS model was also used to measure or project the economic impacts of Alternative B.

As indicated in Table 4.10-2, direct annual regional economic impacts would occur as a result of operations under Alternative B. There would be an increase of 752 employees in the government, retail trade, services and industrial sectors, which would increase the regional economy by \$13.8 million in business volume (sales) and result in \$19.9 million in direct personal income when compared to the No Action Alternative. Employment and income of the 647 full-time equivalent military personnel are included in the direct employment and direct income. The direct income represents the earnings of employees in the government, retail, wholesale and service establishments that would be initially or directly affected by the net gain of military and civilian employees. The increase in business volume reflects increases in the sales of goods, services, and supplies to the military and civilian personnel, and other employment directly associated with project operations.

Table 4.10-2 Annual Alternative B Economic Impacts

	Direct Impacts	Indirect Impacts	Total
Annual Operations Impacts			
Sales (Business) Volume	\$ 13,858,394	\$ 17,149,061	\$31,007,454
Income	\$ 19,957,665	\$ 3,041,236	\$22,998,902
Employment	752	157	909
Annual Construction Impacts¹			
Sales (Business) Volume	\$ 304,856,984	\$60,912,705	\$365,769,690
Income	\$ 76,121,017	\$10,802,337	\$ 86,923,354
Employment	2,471	558	3,028

¹Annual impacts only during the 16-year construction period.

Source: EIFS.

Table 4.10-2 shows the indirect annual regional impacts on secondary sales, employment, and income generated by the employment and business activity directly associated with the expanded operations. The direct increase in sales and employment generates increases in secondary sales of \$17.1 million; the gain of an additional 157 jobs indirectly in the retail trade, services and industry sectors; and, a gain of an additional \$3.0 million in indirect income when compared to the No Action Alternative. Income is indirectly impacted as a result of the increase in sales and employment resulting from the initial economic impacts.

Table 4.10-2 shows the direct annual regional economic impacts of project construction over this 16-year period under Alternative B. These direct construction impacts would include increases of \$304.8 million in business volume (sales); the addition of 2,471 jobs in the construction, retail trade, services and industrial sectors; and include increases of \$76.1 million in direct personal income when compared to the No Action Alternative. Direct employment includes those workers who would accomplish the construction activities associated with Alternative B. Personal income represents the earnings of employees in the construction, retail, wholesale, and service establishments who would be initially or directly affected by the construction activity. The increase in business volume includes the sales of goods, services, and supplies associated with project construction activity.

Table 4.10-2 shows that the indirect economic impacts of project construction include secondary sales of \$60.9 million and an additional 558 jobs indirectly in the retail trade, services, and industry sectors. This results in an additional \$10.8 million in indirect income above the No Action Alternative. Income is indirectly impacted as a result of the indirect increase in sales and employment resulting from the initial economic impacts.

Long-term beneficial economic benefits under Alternative B would be realized as a result of the increase of approximately 647 full-time equivalent military, and civilian employees during operations. The primary inputs for the EIFS operations model under Alternative B include the increase in estimated annual operating expenditures; estimated increase of full-time equivalent military and civilian employees (620); and, annual average incomes of \$28,000 and \$40,000, respectively, for the new military and civilian employees.

With respect to the EIFS model assessment of the economic impacts of construction under Alternative B, the RTV for annual sales volume exceeds the respective regional RTV. With respect to the additional annual operations, the RTVs for each of the three variables (sales volume, income, and employment) were found to be significantly less than the regional RTVs. Thus, project construction would result in significant annual economic impacts to business sales on Guam during the construction period, while the expanded operations under Alternative B would not result in significant annual economic impacts on Guam.

Guam's economy would also realize additional economic benefits from the receipt of income taxes on wages received by the construction workers and new permanent based population. The citizens and residents of Guam, including military personnel, pay federal income taxes to the Guam Treasury rather than the U.S. Treasury. Assuming a 15 percent effective tax bracket, the Guam Treasury could receive between \$3.5 million annually from the additional new military and civilian personnel at Andersen AFB when compared to the No Action Alternative.

Other potential income for the Guam Treasury would be realized from the Gross Receipts Tax levied on businesses. This tax, which is 4 percent, is included in the sales price of consumer goods and services, and is paid by the business establishment. Additional tax revenues from gasoline, alcoholic beverage, and tobacco taxes could also be realized when compared to the No Action Alternative. Since there is no sales tax on consumer goods in Guam, no additional revenue would be realized from this source.

4.10.3 No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established at Andersen AFB. Thus, activities and operations that occur under the baseline would continue and there would be no change to the Base population of approximately 5,900 persons. There would be no need for additional housing. Enrollment in the DoDEA and Guam Public School System schools would remain at baseline levels. The current Guam labor force, employment, unemployment, and economic conditions would continue. Andersen AFB would continue to be a major contributor to the Island's economy through direct military and civilian employment, subsequent creation of indirect employment, and the purchase of goods and supplies from local businesses.

4.10.3.1 Mitigation

There are no impacts to socioeconomic resources that require mitigation.

4.10.4 Cumulative Impacts

4.10.4.1 Alternative A

Population

There would be short-term and long-term increases in population because of Alternative A and the other actions. The other actions in this assessment include 80 additional personnel associated with two other identified units, and construction of the munitions igloos. Short-term population increases would result from the required construction labor, the majority of which would consist of skilled U.S. workers from elsewhere in the U.S. A total labor supply of approximately 2,600 workers is estimated for the combined Alternative A, Northwest Field initiatives, and other actions, of which 80 percent may have to consist of skilled U.S. workers from elsewhere in the U.S. due to the local shortage of skilled workers. Thus, local housing would need to be provided for approximately 2,080 workers.

There is a potential increase of 4,248 in the population, all of which would be located on-Base. This population increase would represent an approximate 72 percent increase over the No Action Alternative on-Base permanent population of approximately 5,900.

Housing

Additional on-Base family housing units and dormitory spaces would be required to accommodate personnel for Alternative A and the other actions. There would be a shortfall of 470 family housing units when applying the current on-Base inventory of 250 vacant on-Base military family housing units plus the 190 units (440 total units) that would be constructed under Alternative A to the demand for an additional cumulative 910 units (450 units for Alternative A

and 460 units for the other actions). As mentioned in Subchapter 3.10.2, there was an inventory of 484 off-Base houses and condominiums listed for sale and the houses and condominiums available for lease in Guam in April 2005. Nearly all the inventory of 484 off-Base units would be needed for the requirement of 470 units assuming the inventory is typical for Guam.

New dormitory spaces would also be constructed to accommodate the additional housing demand for unaccompanied military personnel. One of the dormitories would be constructed to house transitory students at Northwest Field.

The off-Base housing discussion for skilled workers from elsewhere in the U.S. in Subchapter 4.10.1.2 applies.

Education

There could be a 70-75 percent increase in the on-Base DoDEA school enrollment as a result of new military personnel associated with Alternative A, Northwest Field initiatives, and other actions. Because incoming military personnel would reside on-Base, the majority of school enrollment increase would occur in the DoDEA schools on Andersen AFB. The projected enrollment increase would be approximately 900-950 new students, including approximately 175-185 high school students, when compared to the No Action Alternative.

The current enrollment of the DoDEA Andersen Elementary/Middle Schools is 1,300 students, with an enrollment capacity of 1,522 students. The majority of this current excess capacity is at Andersen Elementary, while Andersen Middle School is near capacity. The addition of as many as 765 elementary/middle school students to the existing enrollment would expand the student population to about 2,065 students, exceeding the capacity by about 543 students. The current enrollment of the DoDEA Guam High School is 435 students, with an enrollment capacity of 450 students. The addition of as many as 185 high school students to the existing enrollment would expand the student population to about 620 students, exceeding the capacity by about 170 students.

One of the ISR/Strike projects would construct a DoDEA high school, which would accommodate the additional high school students. Vacated space in the existing high school should be able to accommodate the additional elementary/middle school students. Should additional space be needed, portable buildings similar to those used by public school districts could be used to alleviate overcrowding.

Economy

Table 4.10-3 shows the annual cumulative economic impacts of the additional long-term construction activities associated with Alternative A, Northwest Field initiatives, and the other actions. These impacts are in addition to the current economic impacts to Andersen AFB. Total annual direct cumulative impacts include an increase of \$678 million in direct business sales; \$167 million increase in direct income; and an increase of 3,196 in direct employment when compared to the No Action Alternative. Total annual indirect cumulative impacts include an increase of \$135 million in indirect business sales; \$24 million increase in indirect income; and an increase of 723 in indirect employment when compared to the No Action Alternative. None of the RTVs for sales volume, income, or employment would be equaled or exceeded under the cumulative impacts of Alternative A, Northwest Field initiatives, and the other actions.

Therefore, the annual cumulative economic impacts of the additional operations under Alternative A and other actions would not to be considered significant.

Table 4.10-3 Annual Alternative A Cumulative Economic Impacts: Construction

	Direct Impacts	Indirect Impacts	Total
Sales (Business Volume)			
Alternative A	\$339,648,917	\$67,864,394	\$407,513,311
Northwest Field initiatives	\$236,760,996	\$46,349,868	\$283,110,864
Other Actions ²	\$101,687,892	\$20,317,998	\$122,005,890
Cumulative Impact	\$678,097,805	\$134,532,260	\$812,630,065
Income			
Alternative A	\$84,790,884	\$12,035,158	\$96,826,042
Northwest Field initiatives	\$56,685,816	\$ 8,219,742	\$64,905,558
Other Actions ²	\$25,390,872	\$ 3,603,222	\$28,994,094
Cumulative Impact	\$166,867,572	\$23,858,122	\$190,725,694
Employment			
Alternative A	2,752	621	3,373
Northwest Field initiatives	307	71	378
Other Actions ²	137	31	168
Cumulative Impact	3,196	723	3,919

Source: Economic Impact Forecast System.

Total annual cumulative potential federal income taxes received by the Guam Treasury as a result of the additional permanently stationed military personnel could range between \$4-\$5 million above the No Action Alternative. This amount represents the potential total federal income taxes on wages paid to the new military and civilian personnel associated with the Andersen AFB ISR/Strike Alternative A and other actions. Additional GovGuam revenues would be generated by the Gross Receipts Tax, and gasoline, alcohol, tobacco, and other taxes.

Table 4.10-4 shows the annual cumulative economic impacts of the additional long-term operations associated with Alternative A, Northwest Field initiatives, and the other actions. These impacts are in addition to the current economic impacts to Andersen AFB experienced under the No Action Alternative. Total annual direct cumulative impacts include an increase of \$34.5 million in direct business sales; \$48.6 million increase in direct income; and an increase of 1,811 in direct employment when compared to the No Action Alternative. Total annual indirect cumulative impacts include an increase of \$42.7 million in indirect business sales; \$7.6 million increase in indirect income; and an increase of 391 in indirect employment when compared to the No Action Alternative. None of the RTVs for sales volume, income, or employment would be equaled or exceeded under the cumulative impacts of Alternative A, Northwest Field initiatives, and other actions. Therefore, the annual cumulative economic impacts of the additional operations under Alternative A, Northwest Field initiatives, and other actions to business volume, income, and employment in Guam would not to be considered significant.

Table 4.10-4 Annual Alternative A Cumulative Economic Impacts: Operations

	Direct Impacts	Indirect Impacts	Total
Sales (Business Volume)			
Alternative A	\$23,122,947	\$28,613,476	\$51,736,423
Northwest Field initiatives	\$ 9,415,183	\$11,650,813	\$21,065,996
Other Actions	\$ 1,977,188	\$ 2,446,670	\$ 4,423,858
Cumulative Impact	\$34,515,318	\$42,710,959	\$77,226,277
Income			
Alternative A	\$33,500,653	\$ 5,074,350	\$ 38,575,003
Northwest Field initiatives	\$12,445,701	\$ 2,066,170	\$ 14,511,871
Other Actions	\$ 2,613,597	\$ 433,395	\$ 3,047,492
Cumulative Impact	\$48,559,951	\$ 7,575,915	\$56,134,366
Employment			
Alternative A	1,262	262	1,524
Northwest Field initiatives	458	107	565
Other Actions	91	22	113
Cumulative Impact	1,811	391	2,202

Source: Economic Impact Forecast System.

Total annual cumulative potential federal income taxes received by the Guam Treasury as a result of the additional permanently stationed military personnel could range between \$5-\$6 million above the No Action Alternative. This amount represents the potential total federal income taxes on wages paid to the new military and civilian personnel. Additional federal income tax revenues would be received from other directly and indirectly related employment associated with Alternative A, Northwest Field initiatives, and other actions. Additional GovGuam revenues would be generated by the Gross Receipts Tax, and gasoline, alcohol, tobacco, and other taxes.

Other cumulative indirect economic impacts would occur as a result of both the short-term and long-term direct impacts. The population resulting from the construction and subsequent operations of Alternative A and the other actions would create additional demand for consumer goods and services. This new demand could foster new commercial development in the form of retail goods and service outlets. This new development would, in turn, require additional investment in the associated public infrastructure, and would enhance the property tax revenue base of Guam.

4.10.4.2 Alternative B

Population

There would be short-term and long-term increases in population because of Alternative B and the other actions. The other actions in this assessment include only an additional 80 personnel associated with two other units, and construction of the munitions igloos. Short-term population increases would result from the required construction labor, the majority of which would consist of skilled U.S. workers from elsewhere in the U.S. A total labor supply of approximately 2,350 workers is estimated for the combined Alternative B, Northwest Field

initiatives, and other actions, of which 80 percent may have to consist of skilled U.S. workers from elsewhere in the U.S. due to the local shortage of skilled workers. Thus, local housing would have to be provided for approximately 1,880 workers.

There is a potential increase of 3,098 in the population, all of which would be located on-Base. This population increase would represent an approximate 53 percent increase over the No Action Alternative on-Base permanent population of approximately 5,900.

Housing

Additional on-Base family housing units and dormitory spaces would be required to accommodate personnel for Alternative B and the other actions. There would be a shortfall of 310 family housing units when applying the current on-Base inventory of 250 vacant on-Base military family housing units to the demand for an additional cumulative 560 units (100 units for Alternative B and 460 units for the other actions). As mentioned in Subchapter 3.10.2, there was an inventory of 484 off-Base houses and condominiums listed for sale and the houses and condominiums available for lease in Guam in April 2005. The need for 310 units could be accommodated by the inventory of 484 off-Base units assuming the inventory is typical for Guam.

The discussion of dormitory space and housing for skilled workers from elsewhere in the U.S. for Alternative A applies to Alternative B.

Education

There could be an approximate 30-35 percent increase in the on-Base DoDEA school enrollment as a result of the new military personnel associated with Alternative B and the other actions. Because incoming military personnel would reside on Base, the majority of school enrollment increase would occur in the DoDEA schools on Andersen AFB. The projected enrollment increase could be approximately 450-475 new students, including approximately 90-95 high school students, when compared to the No Action Alternative.

The current enrollment of the DoDEA Andersen Elementary/Middle Schools is 1,300 students, with an enrollment capacity of 1,522 students. The majority of this current excess capacity is at Andersen Elementary, while Andersen Middle School is near capacity. The addition of as many as 380 elementary/middle school students to the existing enrollment would expand the student population to about 1,680 students, exceeding the capacity by about 158 students. The current enrollment of the DoDEA Guam High School is 435 students, with an enrollment capacity of 450 students. The addition of as many as 95 high school students to the existing enrollment would expand the student population to about 530 students, exceeding the capacity by about 80 students.

One of the ISR/Strike projects would construct a DoDEA high school, which would accommodate the additional high school students. Vacated space in the existing high school could be used to accommodate the additional elementary/middle school students. Should additional space be needed, portable buildings similar to those used by public school districts could be used to alleviate overcrowding.

Economy

Under Alternative B and the other actions, short-term and long-term cumulative economic impacts would occur. The annual impacts on employment, income, and sales volume indicated in Table 4.10-5 for the construction associated with Alternative B and other actions are each multiplied by six (length of construction period) to determine the total impacts for each economic variable. The annual impacts of the construction activity associated with the other actions are also each multiplied by six and added to Alternative B totals to estimate the overall total cumulative impact for each economic variable over the 16-year construction period.

Table 4.10-5 shows the annual cumulative economic impacts of the construction projects associated with Alternative B, Northwest Field initiatives, and the other actions. The majority of these economic impacts would be associated with Alternative B. Total cumulative impacts, inclusive of both direct and indirect impacts, include an increase of \$771 million in business sales; \$181 million increase in income; and an increase of 3,574 in employment when compared to the No Action Alternative. These values represent the total cumulative impact during the 16-year construction period. The RTVs for sales volume and income are exceeded under the cumulative impacts of Alternative B, Northwest Field initiatives, and the other actions. Thus, the annual cumulative economic impacts of project construction on the sales volume and income of Guam would be considered significant. In addition, the maximum annual RTV for the increase in employment is almost equaled by the annual cumulative employment generated by the combined construction projects of Alternative B, Northwest Field initiatives, and the other actions.

Table 4.10-5 Annual Alternative B Cumulative Economic Impacts: Construction

	Direct Impacts	Indirect Impacts	Total
Sales (Business Volume)			
Alternative B	\$ 304,856,984	\$60,912,705	\$365,769,690
Northwest Field initiatives	\$ 236,760,996	\$ 46,349,868	\$ 283,110,864
Other Actions ²	\$ 101,687,892	\$ 20,317,998	\$ 122,005,890
Cumulative Impact	\$643,305,872	\$127,580,571	\$770,886,444
Income			
Alternative B	\$ 76,121,017	\$10,802,337	\$ 86,923,354
Northwest Field initiatives	\$ 56,685,816	\$ 8,219,742	\$ 64,905,558
Other Actions ²	\$ 25,390,872	\$ 3,603,222	\$ 28,994,094
Cumulative Impact	\$158,197,705	\$22,628,301	\$180,823,006
Employment ¹			
Alternative B	2,471	558	3,028
Northwest Field initiatives	307	71	378
Other Actions ²	137	31	168
Cumulative Impact	2,915	660	3,574

¹ Annual employment for a period of 16 years.

² Includes munitions igloos only.

Source: Economic Impact Forecast System.

Total cumulative potential federal income taxes received by the Guam Treasury during this 16-year construction period would approximate \$80-\$90 million above the No Action Alternative, or between \$13-\$15 million annually. This amount represents the potential total federal income taxes on wages paid to the construction workers during the 16-year construction period in addition to income earned by other direct and indirect employment. Additional Government of Guam revenues would be generated by the Gross Receipts Tax, gasoline, alcohol, and tobacco taxes.

Table 4.10-6 shows the annual cumulative economic impacts of the additional long-term operations associated with Alternative B, Northwest Field initiatives, and other actions. These impacts are in addition to the current economic impacts to Andersen AFB. Total annual direct cumulative impacts include an increase of \$25.3 million in direct business sales; \$35.0 million increase in direct income; and an increase of 1,301 in direct employment when compared to the No Action Alternative. Total annual indirect cumulative impacts include an increase of \$31.2 million in indirect business sales; \$5.5 million increase in indirect income; and an increase of 286 in indirect employment when compared to the No Action Alternative. None of the RTVs for business sales, income and employment would be equaled or exceeded under the cumulative impacts of Alternative B and the other actions. Therefore, the annual cumulative economic impacts of Alternative B, Northwest Field initiatives, and other actions would not be considered significant.

Table 4.10-6 Annual Alternative B Cumulative Economic Impacts: Operations

	Direct Impacts	Indirect Impacts	Total
Sales (Business Volume)			
Alternative B	\$13,858,394	\$17,149,061	\$ 31,007,454
Northwest Field initiatives	\$ 9,415,183	\$11,650,813	\$ 21,065,996
Other Actions	\$ 1,977,188	\$ 2,446,670	\$ 4,423,858
Cumulative Impact	\$25,250,765	\$31,246,544	\$ 56,497,308
Income			
Alternative B	\$ 19,957,665	\$ 3,041,236	\$22,998,902
Northwest Field initiatives	\$12,445,701	\$ 2,066,170	\$ 14,511,871
Other Actions	\$ 2,613,597	\$ 433,895	\$ 3,047,492
Cumulative Impact	\$35,016,963	\$ 5,541,301	\$ 40,558,265
Employment			
Alternative B	752	157	909
Northwest Field initiatives	458	107	565
Other Actions	91	22	113
Cumulative Impact	1,301	286	1,587

Source: Economic Impact Forecast System.

Total annual cumulative potential federal income taxes received by the Guam Treasury as a result of the additional permanently stationed military and civilian personnel could range between \$2-\$3 million above the No Action Alternative. This amount represents the potential total federal income taxes on wages paid to the new military and civilian personnel associated

with Alternative B and other actions. Additional Government of Guam revenues would be generated by the Gross Receipts Tax, and gasoline, alcohol, tobacco, and other taxes.

Other cumulative indirect economic impacts would occur as a result of both the short-term and long-term direct impacts. The population resulting from construction and subsequent operations of Alternative B and the other actions would create additional demand for consumer goods and services. This new demand could foster new commercial development in the form of retail goods and service outlets. This new development would, in turn, require additional investment in the associated public infrastructure, and would enhance the property tax revenue base of Guam.

4.11 AIRFIELD OPERATIONS, AIRCRAFT SAFETY, AND BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD

Factors considered when evaluating airfield operations impacts include:

- The operations capacity of the airfield to accommodate the increase in operations associated with the action;
- The ability of the air traffic control procedures to accommodate the operations associated with the action;
- The probability of an aircraft involved in an accident striking a person or structure on the ground; and
- The probability of a bird/wildlife aircraft strike resulting in an aircraft accident, injuring either aircrews or the public, or damaging property (other than the aircraft).

4.11.1 Alternative A

4.11.1.1 Airfield Operations

Under Alternative A, annual airfield operations at the Base would increase by 38,868 operations from 85,734 to 124,602 operations (see Tables 2.3-1 and 2.2-2, respectively), a 45 percent increase when compared to the No Action Alternative. The 124,602 operations would equate to about 35 percent of the airfield capacity, an increase of approximately 11 percent when compared to the No Action Alternative. The operating characteristics of the ISR/Strike aircraft are similar to the fighter, bomber, and tanker aircraft that operate at the Base under the baseline condition. The ISR/Strike KC-135, B-1, B-2, B-52, and Global Hawks would primarily use Runway 06R/24L, and the F-22 and F-15E aircraft would use Runway 06L/24R. Many of the baseline condition traffic patterns could be used by the ISR/Strike aircraft. Additional arrival, departure, and closed pattern flight tracks and related air traffic control procedures would be added to Runway 06L/24R for use by the ISR/Strike fighter aircraft. The air traffic control tower and Guam Approach and Departure Control would establish procedures for the additional flight tracks. The airspace can accommodate the additional flight tracks and the control procedures needed for the additional traffic patterns would not conflict with the existing procedures. The aircraft flight profiles associated with the ISR/Strike aircraft would not be affected by, nor would they affect, the restrictions that limit aircraft overflight of MSA 1, Mariana crow territories, and the Mariana fruit bat colony.

4.11.1.2 Aircraft Safety

It is impossible to predict the precise location of an aircraft accident. However, aircraft flight tracks are developed to avoid overflying residences and built-up areas to the maximum extent practicable. As mentioned in Subchapter 3.11.2, 68 percent of the Air Force aircraft accidents that occur within a 10-NM radius of an airfield happen either on the airfield or within an area that is 3,000 feet wide and extends out to a distance of 15,000 feet from the end of the runway. Historical data show that large aircraft such as the tanker and bomber would have a 20 percent probability of being involved in an accident within the 10-NM radius and fighter aircraft would have an 80 percent probability. The types of landing and takeoff operations the ISR/Strike F-22, F-15E, B-1, B-2, B-52, KC-135 aircraft and Global Hawks would accomplish at Andersen AFB would be consistent with those currently flown at the Base and those associated with the operations on which the 10-year averages listed in Table 3.11-1 are based. Thus, the mishap distribution discussed in Subchapter 3.11.2 would apply to the operations projected under Alternative A. For these reasons, the probability is low that an aircraft involved in an accident at or around the Andersen AFB airfield would strike a person or structure on the ground.

4.11.1.3 Bird/Wildlife-Aircraft Strike Hazard

Bird/wildlife aircraft strike hazards can be assessed using a combination of bird distribution and behavior factors and aircraft operational factors. Some of these factors include:

- Size and behavior of the predominant bird species;
- Presence of specialized habitat or location that favors migration patterns or large concentrations of birds;
- Frequency and location of takeoffs and landings;
- Altitude of flight operations; and
- Flight characteristics of the aircraft, including size, airspeed, and number of engines.

Overall, it is estimated the total annual airfield operations at Andersen AFB would increase by about 45 percent when compared to the No Action Alternative. Thus, bird/wildlife aircraft strikes associated with airfield operations at Andersen AFB would be expected to increase commensurate with the increase in airfield operations. Based on the 8-year average data listed in Table 3.11-3 and the increase in airfield operations, it is estimated that approximately four annual bird/wildlife aircraft strikes would occur when applying the increase in airfield operations to the baseline strike rate per airfield operation. Table 4.11-1 lists the quarterly bird/wildlife aircraft strikes based on the baseline monthly average bird-aircraft strikes per airfield operation and the projected quarterly operations. The altitude distribution for bird/wildlife-aircraft strikes in Table 3.11-2 would apply to Alternative A.

The number of bird/wildlife aircraft strikes described in the previous paragraph could fluctuate as a result of the cyclical patterns of bird populations. Historically, one-half of 1 percent of all reported bird-aircraft strikes involving Air Force aircraft resulted in a serious mishap. Therefore, it is unlikely that any of these bird-aircraft strike incidents would result in an aircraft accident, involve injury either to aircrews or to the public, or damage to property (other than the aircraft).

Table 4.11-1 Estimated Alternative A Bird/Wildlife Aircraft Strikes

Month	Baseline Quarterly Average	Estimated Quarterly/Annual Bird-Aircraft Strikes	Net Change	Percent Change
January-March	0.875	1.272	+0.397	+45.4%
April-June	0.625	0.908	+0.283	+45.3%
July-September	0.250	0.363	+0.113	+45.2%
October-December	1.250	1.817	+0.567	+45.4%
Annual	3.000	4.360	+1.360	+45.3%

Note: Baseline average strikes per quarter based on the 8-year average quarterly bird/wildlife aircraft strike (1997-2004) divided by average quarterly aircraft operations.

Source: Andersen AFB 2005b.

There is little information on the possibility of aircraft-bird or aircraft-bat strikes on either the Mariana crow or the Mariana fruit bat. The Mariana crow nests in trees between 15 and 55 feet tall, and the Mariana fruit bat roosts in trees of similar height. The crows forage on the ground or along the tree trunks, and the bats forage on fruit trees that are generally smaller than the trees in which they roost. At Pati Point, aircraft altitude would not be expected to be lower than 900 feet AGL, and at Tarague Channel, aircraft would be no lower than 1,000 feet AGL. Even if the birds or the bats fly above the tree canopies, based on their foraging activities, they would likely not be higher than 100 feet AGL, an altitude that would provide 800 to 900 feet of separation between the crow or bat and aircraft. Continued use of the restriction that limits aircraft overflight altitude along the Andersen AFB cliff line to 1,000 feet AGL or above would reduce the potential for bird/wildlife aircraft strike hazards.

4.11.2 Alternative B

4.11.2.1 Airfield Operations

Under Alternative B, annual airfield operations at the Base would increase by 35,009 operations from 85,734 to 120,743 operations (see Tables 2.3-1 and 2.2-11, respectively), a 41 percent increase when compared to the No Action Alternative. The 120,743 operations would equate to about 34 percent of the airfield capacity, an increase of approximately 10 percent when compared to the No Action Alternative. The type of aircraft associated with Alternative B are identical to Alternative A. The only difference between Alternative B and Alternative A is that there would be 3,859 fewer annual operations under the alternative. Therefore, the discussion and analysis for Alternative A apply to Alternative B.

4.11.2.2 Aircraft Safety

The type of aircraft associated with Alternative B are identical to Alternative A. Therefore, the discussion and analysis for Alternative A apply to Alternative B and the probability is low that an aircraft involved in an accident at or around the Andersen AFB airfield would strike a person or structure on the ground.

4.11.2.3 Bird/Wildlife Aircraft Strike Hazard

The factors used for Alternative A analysis were used for Alternative B. Overall, it is estimated the total annual airfield operations at Andersen AFB under Alternative B would increase by about 34 percent when compared to the No Action Alternative. Thus, bird/wildlife aircraft strikes associated with airfield operations at Andersen AFB would be expected to increase commensurate with the change in airfield operations. Based on the 8-year average data listed in Table 3.11-3 and the increase in airfield operations, it is estimated that approximately four annual bird/wildlife aircraft strikes would occur when applying the increase in airfield operations to the baseline strike rate per airfield operation. Table 4.11-2 lists the quarterly bird/wildlife aircraft strikes based on the baseline monthly average bird/wildlife aircraft strikes per airfield operation and the projected quarterly operations. The altitude distribution for bird/wildlife aircraft strikes in Table 3.11-2 would apply to Alternative B. The bird/wildlife aircraft strike fluctuation, the bird/wildlife aircraft strike mishap, and the Mariana crow and Mariana fruit bat discussion for Alternative A apply to Alternative B. It is unlikely that any of these bird/wildlife aircraft strike incidents would result in an aircraft accident, involve injury either to aircrews or to the public, or damage to property (other than the aircraft). Continued use of the restriction that limits aircraft overflight altitude along the Andersen AFB cliff line to 1,000 feet AGL or above would reduce the potential for bird/wildlife aircraft strike hazards.

Table 4.11-2 Estimated Alternative B Bird/Wildlife Aircraft Strikes

Month	Baseline Quarterly Average	Estimated Quarterly/Annual Bird-Aircraft Strikes	Net Change	Percent Change
January-March	0.875	1.232	+0.357	+40.8%
April-June	0.625	0.880	+0.255	40.8
July-September	0.250	0.352	+0.102	+40.8%
October-December	1.250	1.760	+0.510	+40.8%
Annual	3.000	4.224	+1.224	+40.8%

Note: Baseline average strikes per quarter based on the 8-year average quarterly bird/wildlife strikes (1997-2004) divided by average quarterly aircraft operations.

Source: Andersen AFB 2005b.

4.11.3 No Action Alternative

Under the No Action Alternative, the ISR/Strike capability would not be established and the type and level of airfield operations would continue at the baseline condition. The existing air traffic control procedures accommodate the baseline airfield operations and the airfield has the capacity for the 85,734 annual operations. The existing conditions for aircraft safety and bird-aircraft strikes would continue because there would be no change in the type and level of airfield operations.

4.11.4 Mitigation

There are no airfield operations, aircraft safety, or bird-aircraft strike impacts from either Alternative A or Alternative B that require mitigation.

4.11.5 Cumulative Impacts

None of the other actions proposed at Andersen AFB include aircraft basing or airfield operations. Therefore, no cumulative airfield operations, aircraft safety, or bird/wildlife aircraft strike impacts would occur.

4.12 ENVIRONMENTAL JUSTICE

Environmental justice analysis considers if minority and/or low-income populations would bear a disproportionate amount of adverse health and environmental effects as a result of an action.

4.12.1 Alternative A

The off-Base community surrounding Andersen AFB is characterized by disproportionately higher minority and low-income populations, with approximately 23 percent of persons living below the federally designated poverty level. This community is also approximately 93 percent minority. Some of the villages near Andersen AFB exhibit a higher percentage of low-income individuals and minority population than Guam as a whole. For this reason, an environmental justice evaluation was performed to determine if Alternative A would result in environmental impacts that would be considered disproportionately adverse to this specific community.

Due to the nature of Alternative A, the key environmental resource that could potentially contribute to localized impacts to communities with disproportionately higher minority and low-income populations is limited to noise. Alternative A would result in an increase in the number of persons within the DNL 65 dBA noise level resulting from aircraft operations. The noise analysis has determined that:

- Alternative A would result in a 475 percent increase in acres of land that would be exposed to a noise level of DNL 65 dBA and greater when compared to the baseline condition. The area within the DNL 65 dBA for Alternative A would extend approximately 4 miles farther southwest to the village of Dededo when compared to the No Action Alternative (baseline) condition.
- Alternative A would result in an exposure of 2,566 off-Base persons to a noise level of DNL 65 dBA and greater. This would result in an 902 percent increase in the number of persons who would be exposed to a noise level of DNL 65 dBA and greater when compared to the baseline condition. Approximately 6 percent of the population living within the Andersen AFB airfield airspace would be exposed to a noise level of DNL 65 dBA and greater. The density of residences in the newly exposed areas would be consistent with adjacent residential areas exposed to aircraft noise under the No Action Alternative.
- Alternative A would result in a 952 percent increase in number of persons potentially highly annoyed by noise resulting from aircraft operations when compared to baseline conditions. It is estimated that 552 persons could be potentially highly annoyed by this noise exposure.
- Single event noise from Alternative A at four locations (Dededo, Pati Point, Tarague Channel, and Uruno Point) would be up to 6 dBA greater than baseline conditions. A change of 3 dB is just perceptible, while a change of 5 dB is clearly noticeable (Bies

and Hanson 1988). No structural damage would be expected to result from ISR/Strike aircraft operations.

- The potential for speech disruption from aircraft overflight would increase.

Increases in noise exposure from Alternative A, which may occur in areas that exhibit a disproportionately higher minority and low-income population, would not be expected to result in adverse effects on human health. Alternative A would not cause adverse impacts to human health or the environment of neighboring populations. Because significant environmental impacts would not result, no disproportionately high or adverse effects to minority and low-income populations in the Andersen AFB area are anticipated.

4.12.2 Alternative B

As discussed in Subchapter 4.1.2, noise modeling for Alternative B indicated no discernable difference in the Alternative B noise contours and noise exposure when compared to Alternative A. Therefore, the discussion and analysis of environmental justice for Alternative A apply to Alternative B.

4.12.3 No Action Alternative

The No Action Alternative would result in no changes to existing and planned noise conditions. Disproportionately adverse effects to minority and low-income populations would not result from the No Action Alternative.

4.12.4 Mitigation

No environmental injustice would occur. Therefore, no mitigation would be required.

4.12.5 Cumulative Impacts

There would be no other actions with potential off-Base noise impacts in the area of Andersen AFB. Environmental justice concerns have been addressed in the NEPA analysis for other projects, and appropriate mitigation would be accomplished for these projects by each proponent. Establishment and operation of the ISR/Strike capability, when combined with other planned projects, would not contribute cumulative impacts to minority or low-income populations in the area.

4.13 COMPARISON OF ENVIRONMENTAL EFFECTS OF ALL ALTERNATIVES

4.13.1 Alternative A Impacts

Table 4.13-1 summarizes the impacts of Alternative A, Alternative B, and the No Action Alternative.

4.13.2 Cumulative Impacts

Table 4.13-2 summarizes the cumulative impacts.

4.14 MITIGATION

Mitigation and conservation measures would be recommended to reduce the potential for adverse effects (noise, cultural resources, and biological resources).

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Table 4.13-1 Summary of Environmental Impacts for Alternative A, Alternative B, and No Action Alternative

Resource	Alternative A	Alternative B	No Action Alternative
Noise	An additional 2,566 people would be exposed to DNL 65 dBA and greater; however, nobody would be exposed to DNL 75 dBA and greater. These 2,566 people would equate to 6 percent of the persons who live within the 5-mile radius associated with the airfield airspace environment. The density of residences in the newly exposed area would be consistent with adjacent residential areas exposed to aircraft noise under the baseline condition. New facilities and family housing would be constructed to achieve an indoor noise level of DNL 45 dBA or less. The nearby off- and on-Base schools would continue to be exposed to noise from aircraft operations. The on-Base high school would be constructed to meet NLR standards. It is doubtful an individual would be exposed to noise that would produce hearing loss. Noise during an aircraft overflight could cause a decrease in speech intelligibility or cause individuals to have to move closer together to be heard. Construction noise would be temporary, would occur only during daytime, and would cease when the project is completed.	Noise modeling for Alternative B indicated there is no discernable difference in the alternative action noise contours and noise exposure when compared to Alternative A. The discussion, analysis, and conclusions for Alternative A for noise from aircraft operations and construction activities apply to Alternative B.	The types and levels of activities, to include airfield operations, would remain at the current conditions, and the existing noise environment would continue. Approximately 256 off-Base persons would continue to be exposed to DNL 65 dBA and greater.
Land Use	On-Base land use conflicts would not occur because land use categories in the General Plan were developed by considering the proposed ISR/Strike activities. There would be no change to the aesthetic view from adjacent off-Base properties. None of the facilities that would be constructed would interfere with existing access to non-Air Force land between Andersen AFB, the Pacific Ocean, and the Philippine Sea. Based on the increased area of exposure and the AICUZ program guidance, Andersen AFB would provide the noise contours and land use sections of this EIS to local planning agencies to serve as an interim AICUZ report. A full update to the AICUZ Report would be provided to the community within 1 year after the completed mission change. Housing for construction workers who may temporarily relocate to Guam would be based on GovGuam regulations.	The discussion and analysis for Alternative A apply to Alternative B.	Routine facilities actions at Andersen AFB would be accomplished in accordance with the Base's General Plan. Based on the increased area of exposure and the AICUZ program guidance for updating the most recent AICUZ report, Andersen AFB would prepare an update to the 2001 AICUZ Report to identify potential land use incompatibility from aircraft noise.
Air Quality	Construction emissions would be temporary, fall off rapidly with distance from the proposed construction site, and would not result in any long-term impacts. Neither construction nor recurring aircraft and vehicle emissions from Alternative A would cause a violation of federal standards. A Final General Conformity Rule Conformity Determination would not be required.	The summary for Alternative A applies to Alternative B.	Emissions from current aircraft operations, aircraft maintenance, vehicles, boilers, generators, fueling operations, and industrial processes would continue at current levels, which do not exceed air quality standards.

Table 4.13-1 Summary of Environmental Impacts for Alternative A, Alternative B, and No Action Alternative (*continued*)

Resource	Alternative A	Alternative B	No Action Alternative
Infrastructure and Utilities	<p>Water consumption would equate to about 20 percent of the system capacity.</p> <p>Wastewater generation would result in the WWTP operating at 82 percent of capacity. The Base would continue negotiating with the GWA to determine the amount of wastewater the Base will be allowed to send to the Northern WWTP.</p> <p>Electricity consumption would equate to approximately 4 percent of the GPA generation capacity. Where practicable, facilities would be constructed in an energy-efficient and sustainable manner.</p> <p>The existing drainage basins and storm water management systems would handle the increase in run off due the increase in impervious cover. The loss of the three wells that inject storm water into the aquifer should not present a problem because there are other nearby wells that currently are under capacity and to which storm water can be channeled. New designs that incorporate devices to increase ponding and retention (pre-treatment) would be implemented. New oil/water separator systems would also be required. Construction contractors would ensure an EPP is prepared, provided to Andersen AFB for submittal to Guam EPA, and approved before initiating activities.</p> <p>It is estimated the landfill would reach 100 percent capacity by December 2007, regardless of Alternative A activities. A study is currently being conducted to investigate the possibility of vertically extending the current landfill for use beyond 2009. The study scheduled for completion in January 2007. Thus, Andersen AFB plans to use the expanded on-Base landfill until 2009 or later if the current study supports expansion, and then use a permitted landfill. Although it is not known at this time which landfill would be used, there are three possible options: (1) the proposed GovGuam landfill after it becomes available in 2009-2010; (2) the on-Base landfill that would be constructed as an ISR/Strike project; and (3) the Navy landfill. Planning for the GovGuam and ISR/Strike landfills has not progressed to the point where the capacities or life spans are known. Therefore, quantitative analysis of the impact of the ISR/Strike project on the landfill cannot be accomplished. The Base would submit the permit application for Guam EPA coordination for the ISR/Strike landfill project. All green waste would continue to be segregated and collected for mulching, chipping, and composting or burned in small piles on site after obtaining a burning permit from the local fire department. Andersen AFB would continue its aggressive pollution prevention and recycling program to divert solid waste. Contracts issued for construction activities would require the contractor to recycle construction and demolition debris to the maximum extent possible.</p>	<p>Water consumption would equate to about 17 percent of the system capacity.</p> <p>Wastewater generation would result in the WWTP operating at 82 percent of capacity. The negotiation analysis for Alternative A applies.</p> <p>Electricity consumption would equate to approximately 4 percent of the GPA generation capacity. The energy efficiency analysis for Alternative A applies.</p> <p>The Alternative A storm water, landfill, pollution prevention, recycling, and traffic discussions apply.</p>	<p>Water consumption equates to about 13 percent of the system capacity.</p> <p>The WWTP would continue to operate at about 79 percent of capacity.</p> <p>The Base would continue to consume electricity at a rate that equates to about 4 percent of the GPA generation capacity.</p> <p>The existing communications system would meet the immediate needs of the Base.</p> <p>Storm water would be managed using existing procedures and runoff would continue at existing rates.</p> <p>A study is currently being conducted to investigate the possibility of vertically extending the current landfill for use beyond 2009. The study should be completed in January 2007. Thus, Andersen AFB plans to use the expanded on-Base landfill until 2009 or later if the current study supports expansion, and then use a permitted landfill. Although it is not known at this time which landfill would be used, there are two possible options: (1) the proposed GovGuam landfill after it becomes available in 2009-2010; and (2) the Navy landfill. Planning for the GovGuam landfill has not progressed to the point where the capacities or life span is known. Therefore, quantitative analysis of the impact of the No Action Alternative on the landfill cannot be accomplished.</p>

Table 4.13-1 Summary of Environmental Impacts for Alternative A, Alternative B, and No Action Alternative (continued)

Resource	Alternative A	Alternative B	No Action Alternative
Infrastructure and Utilities (cont'd)	The LOS for the intersection of Arc Light Boulevard and Highway 1 and Route 9 at the Main Gate would be LOS C or better during the peak hours of traffic. At LOS C most experienced drivers are comfortable, roads remain safely below but efficiently close to capacity, and posted speed is maintained. Traffic at the intersection of the Commercial Gate and Route 9 would operate at LOS B or better. Some congestion and impingement of maneuverability occur at LOS B and two motorists might be forced to drive side by side, limiting lane changes.		The LOS for the intersection of Arc Light Boulevard and Highway 1 and Route 9 at the Main Gate would remain at LOS B during the peak hours of traffic.
Biological Resources	<p>Construction activities associated with Alternative A would remove 73.9 hectares (182.6 acres) of vegetated land. Vegetated community types subject to removal vary in composition and structure, and therefore, have varying importance to biological resources. Of the 73.9 hectares (182.6 acres) that would be subject to clearing, 57.5 hectares (142.1 acres) can be considered suitable habitat for the listed species, amounting to 1.3 percent of the Refuge Overlay and the Ritidian Unit of the GNWR. Alternative A would also displace ungulates into adjacent habitats, as well as exotic predators (BTS, rats, cats, dogs). Indirect effects from facility operation and construction include the loss of between 80 and 147 hectares (197 – 334 acres) of foraging habitat and between 101 and 147 hectares (249 – 363 acres) of foraging/nesting habitat for the various listed species considered in this EIS.</p> <p>Aircraft operations would increase incrementally under Alternative A. Overflights of Mariana fruit bat foraging and roosting areas, as well as areas suitable for foraging and nesting for Mariana crows, would occur. Much of the acoustic noise associated with aircraft noise is below 2 kHz. Habituation to noise resulting from aircraft overflight would be expected, especially since aircraft overflights would be incrementally increased over a multi-year period.</p> <p>Construction activities and aircraft operations may affect listed species; however, conservation measures would offset any adverse effects. These conservation measures, as part of Alternative A, include an ungulate management program involving ungulate exclosure units near Ritidian Point (200 hectares or 494 acres). Conservation measures also propose to reduce predation of Mariana fruit bat pups at the Pati Point bat colony, foraging plot outplanting, <i>T.rotensis</i> sapling transplanting, as well as a BTS interdiction program. Management activities would be conducted by a Wildlife Management Specialist working in cooperation with GovGuam and federal resource agencies. Vegetation studies would also be accomplished as part of Alternative A. Alternative A conservation measures support projects outlined in the Andersen AFB INRMP recovery actions listed in various USFWS recovery plans, and address general conservation issues on Guam.</p>	The discussion analysis for Alternative A apply to Alternative B.	<p>No clearing of vegetation would occur under the No Action Alternative. The degradation of forest communities would continue under current conditions, including browse pressure and encroachment of herbaceous species.</p> <p>Plant and animal species resources, which include threatened and endangered species, would not change from current conditions.</p> <p>Further, recovery actions outlined in various USFWS recovery plans would not be supported under the No Action alternative.</p>

Table 4.13-1 Summary of Environmental Impacts for Alternative A, Alternative B, and No Action Alternative (*continued*)

Resource	Alternative A	Alternative B	No Action Alternative
Biological Resources (cont'd)	Formal consultation with USFWS under Section 7 of the ESA resulted in the issuance of a BO, which concluded that the ISR/Strike project is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Micronesian kingfisher, Guam rail, or other off-site species listed under the ESA. An incidental take statement, as part of the BO, anticipates the harm of one Mariana fruit bat, mortality of 21 fruit bats on Guam, mortality of 36 fruit bats on Rota, and the harassment of two colonies. This determination is based on the conservation measures described in Subsection 2.2.1.2, as well as Air Force commitments to non-discretionary measures in the BO that seek to minimize disturbance, injury, and death to Mariana fruit bats due to the ISR/Strike project. Take is not anticipated for the other species considered in the analysis of this EIS.		
Groundwater Resources	Water withdrawal from the aquifer would increase by 0.71 percent and the resulting withdrawal would be 6.52 percent of the daily water withdrawn from the aquifer. The use of erosion control techniques during and after construction completion would minimize the potential for groundwater contamination. Base personnel would continue to monitor all construction activity and require an EPP that identifies the actions necessary to reduce or preclude surface contamination from entering the UIC wells.	Water withdrawal from the aquifer would increase by 0.44 percent and the resulting withdrawal would be 6.25 percent of the daily water withdrawn from the aquifer. The erosion control and monitoring discussion for Alternative A applies.	Water withdrawal from the aquifer for Base activities would remain at approximately 2.5 mgd, which is about 5.81 percent of the total daily water withdrawal from the aquifer. The erosion control and monitoring discussion for Alternative A applies.
Earth Resources	New facilities would be constructed to ensure structural stability due to the potential for seismic activity on Guam. Ground disturbance would occur in areas previously disturbed by construction, and no topographic features would be affected. Erosion control measures identified in the EPP that would be prepared for the construction projects, and which would be implemented by the construction contractor, would minimize erosion. Local government clearances from the Depart of Agriculture, Department of Parks and Recreation, and the Historic Preservation Office would be obtained Prior to the commencement of earthmoving activities.	The Alternative A discussion applies.	Continued use of the erosion control measures identified in the Base's SWPPP would minimize erosion.

Table 4.13-1 Summary of Environmental Impacts for Alternative A, Alternative B, and No Action Alternative (*continued*)

Resource	Alternative A	Alternative B	No Action Alternative
Hazardous Materials and Waste	<p>Contractors would be required to use and store hazardous materials in accordance with Base procedures. The contractor would manage hazardous materials and waste in accordance with Andersen AFB, local, and federal guidance, and would be responsible for the storage, treatment, disposal, and transportation off-Guam of any hazardous waste and hazardous material with an expired shelf-life, is out dated, unopened, and/or unused. Hazardous waste and overages of hazardous material would not become the burden of the 36th Wing, Andersen AFB, or the Department of Defense. The existing Base hazardous materials handling processes and procedures would be modified to include any materials needed for the ISR/Strike activities not currently purchased for on-Base use. The quantity of waste generated during construction would be negligible and limited to equipment maintenance products. Any hazardous waste generated during construction would be handled in accordance with federal and local laws and regulations. The Base would dispense about 64,000 gallons of jet fuel daily, which is 0.1 percent of the storage capacity.</p> <p>It is not likely any new hazardous waste streams would occur because of the similarity between the aircraft that operate from the Base under the baseline and those expected with implementation of Alternative A. The existing hazardous waste management processes and procedures should accommodate the waste generated under Alternative A. However, Andersen AFB would increase the 90-day waste storage capacity because the volume of hazardous waste would increase with the addition of as many as 70 aircraft. The construction contractor would be responsible for impacted soil materials at a construction site. Should impacted soil be removed from the site, the construction contractor would be responsible for sampling and characterizing the soil prior to disposal to determine the proper disposal and transportation management methods.</p> <p>Soil that meets hazardous criteria must be managed in accordance with applicable federal requirements, including proper disposal, treatment (if necessary), and transportation. The construction contractor would be responsible for handling and disposal of any Installation Restoration Program (IRP)-related material at an Alternative A site, including a site that is built on top of a known IRP or military munitions response site that has not been completed under the remedial action process. Alternative A construction projects must not hinder access to current IRP sites, areas of concern, other contaminated areas, monitoring wells, and remedial systems for sampling and O&M activities. Average daily jet fuel consumption would equate to about 0.1 percent of the Base's fuel storage capacity.</p>	The Alternative A discussion applies.	Hazardous media and the IRP would continue to be managed using current procedures and guidance. The Base would continue to dispense about 6,027 gallons of jet fuel daily, which is 0.01 percent of the storage capacity.

Table 4.13-1 Summary of Environmental Impacts for Alternative A, Alternative B, and No Action Alternative (*continued*)

Resource	Alternative A	Alternative B	No Action Alternative
Cultural Resources	The Air Force completed the Section 106 process with the GSHPO and accomplished cultural resource surveys in the previously unsurveyed area in which ISR/Strike facilities would be constructed. A report of findings and management recommendations for these properties was submitted to the GSHPO. Based on review of the Executive Summary of the cultural resources inventory, the GSHPO responded in an October 3, 2006 letter that "Further archaeological investigation on prehistoric sites at ISR/Strike will not provide any new information about the project area, but such an investigation will only be redundant to what we already know about the project."	The Alternative A discussion applies.	Cultural resources would continue to be managed in accordance with procedures defined in the Base's ICRMP
Socioeconomic Resources	<p>There would be an overall increase of 3,000 on-Base personnel when considering military personnel and dependents. The off-Base population would temporarily increase for the duration of construction activities because as many as 1,800 skilled U.S. workers from elsewhere in the U.S. would be necessary due to the shortage of local labor on Guam. Construction of on-Base family housing units and dormitories would accommodate the additional personnel. Additional housing for skilled U.S. workers from elsewhere in the U.S. would have to be augmented and supplied from alternative housing sources.</p> <p>Expansion of the DoDEA schools and the addition of teaching/staff support would most likely be necessary to accommodate the potential enrollment increase. The addition of as many as 440 elementary/middle school students to the existing enrollment would exceed the school capacity by about 218 students. The addition of as many as 110 high school students would exceed the school capacity by about 95 students. One of the ISR/Strike projects would construct a DoDEA high school, which would accommodate the additional high school students. Vacated space in the existing high school could be used to accommodate the additional elementary/middle school students. Employment generated by construction activities would result in wages paid, and increase expenditures for local and regional services and supplies during construction. The addition of personnel would result in an increase in wages paid, business sales, and income to the local and regional economy. Interrelated impacts on the physical and natural environment were minimum due to social and economic effects.</p>	<p>There would be an overall increase of 1,850 on-Base personnel when considering military personnel and dependents. The off-Base population would temporarily increase for the duration of the construction activities because as many as 1,600 skilled U.S. workers from elsewhere in the U.S. would be necessary due to the shortage of local labor on Guam. Use of the current inventory of on-Base family housing units and construction of dormitories would accommodate the additional personnel, with some renovations necessary.</p> <p>New dormitory spaces would be constructed to accommodate unaccompanied military personnel. The addition of as many as 70 elementary/middle school students to the existing enrollment would expand the student population, but not exceed capacity. The addition of as many as 20 high school students would exceed the school capacity by about 5 students. One of the ISR/Strike projects would construct a DoDEA high school, which would accommodate the additional high school students. The wages paid, business sales, income to the local and regional economy, and interrelated impacts on the physical and natural environment discussion for Alternative A apply.</p>	The activities and operations that occur under the baseline would continue and there would be no change to the population, housing, education, or economic conditions.

Table 4.13-1 Summary of Environmental Impacts for Alternative A, Alternative B, and No Action Alternative (*continued*)

Resource	Alternative A	Alternative B	No Action Alternative
Airfield Operations, Aircraft Safety, and Bird-Aircraft Strike Hazard	The airfield has the capacity to accommodate the approximate 45 percent increase in airfield operations. Additional arrival, departure, and closed pattern flight tracks and related air traffic control procedures would be added to Runway 06L/24R for use by the ISR/Strike fighter aircraft. The air traffic control tower and Guam Approach and Departure Control would establish procedures for the additional flight tracks. The airspace can accommodate the additional flight tracks, and the control procedures needed for the additional traffic patterns would not conflict with the existing procedures. The aircraft flight profiles associated with the ISR/Strike aircraft would not be affected by, nor would they affect, the restrictions that limit aircraft overflight of MSA 1, Mariana crow territories, and the Mariana fruit bat colony. The probability is low that an aircraft involved in an accident at or around the Andersen AFB airfield would strike a person or structure on the ground. It is estimated that approximately four annual bird/wildlife aircraft strikes would occur. It is unlikely that any of these bird/wildlife aircraft strike incidents would result in an aircraft accident, involve injury either to aircrews or to the public, or damage to property (other than the aircraft). The flight regimes of the Mariana crow and Mariana fruit bat and the altitudes of aircraft would provide sufficient separation to avoid strikes with aircraft.	The airfield has the capacity to accommodate the approximate 41 percent increase in airfield operations. The flight track addition, airspace, aircraft safety, and bird/wildlife aircraft strike analyses for Alternative A apply.	The existing air traffic control procedures accommodate the 85,734 annual airfield operations and the airfield has the capacity for the operations. The existing conditions for aircraft safety and bird/wildlife aircraft strike incidents would continue because there would be no change in the type and level of airfield operations.
Environmental Justice	Alternative A would not result in any environmental impacts to low-income or minority populations that are disproportionately high or adverse as compared to the impacts on the general population. Alternative A would not cause adverse impacts to human health or the environment of neighboring populations. Because significant environmental impacts would not result, no disproportionately high or adverse effects to minority and low-income populations in the Andersen AFB area would occur.	The Alternative A discussion applies.	No changes to existing and planned noise conditions would occur. Disproportionately adverse effects to minority and low-income populations would not occur.

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Table 4.13-2 Summary of Cumulative Impacts

Resource	Cumulative Impacts
Noise	Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. Receptors in the vicinity of ISR/Strike and other action facility construction projects could include persons within 100 feet of noise emanating from equipment operating simultaneously at two construction sites. Construction noise would be temporary, would occur only during daytime, and would cease when the project is completed.
Land Use	Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. As with Alternative A, the other facility actions would be accomplished in accordance with the Andersen AFB General Plan. Facility construction and use would be consistent with land use plans and programs identified in the General Plan. None of the other facilities that would be constructed would interfere with existing access to non-Air Force land between Andersen AFB, the Pacific Ocean, and the Philippine Sea. Existing access procedures would be continued.
Air Quality	Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. None of the construction emissions or the recurring emissions cause a violation of federal standards. A General Conformity Rule Conformity Determination would not be required.
Infrastructure and Utilities	Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. Water consumption would be about 20 percent of system capacity. The WWTP would operate at 82 percent of capacity. The Base would continue negotiating with the GWA to determine the amount of wastewater the Base will be allowed to send to the Northern WWTP. Electricity use would equate to about 46 percent of the GPA generation capacity. The additional impervious cover would equate to a 19 percent increase, and the amount of storm water runoff could increase accordingly. The loss of wells that inject storm water into the aquifer should not present a problem because there are other nearby wells that currently are under capacity and to which storm water can be channeled. New designs that incorporate devices to increase ponding and retention (pre-treatment) would be implemented. New oil/water separator systems would also be required. Construction contractors would ensure an EPP is completed, provided to Andersen AFB for submittal to Guam EPA, and approved before initiating activities. It is estimated the landfill would reach 100 percent capacity by December 2007, regardless of Alternative A and other action activities. A study is currently being conducted to investigate the possibility of vertically extending the current landfill for use beyond 2009. The study is scheduled for completion in January 2007. Thus, Andersen AFB plans to use the expanded on-Base landfill until 2009 or later if the current study supports expansion, and then use a permitted landfill. Although it is not known at this time which landfill would be used, there are three possible options: (1) the proposed GovGuam landfill after it becomes available in 2009-2010; (2) the on-Base landfill that would be constructed as an ISR/Strike project; and (3) the Navy landfill. Planning for the GovGuam and ISR/Strike landfills has not progressed to the point where the capacities or life spans are known. Therefore, quantitative analysis of the impact of the ISR/Strike project on the landfill cannot be accomplished. The Base would submit the permit application for Guam EPA coordination for the ISR/Strike landfill project. All green waste would continue to be segregated and collected for mulching, chipping, and composting or burned in small piles on site after obtaining a burning permit from the local fire department. Andersen AFB would continue its aggressive pollution prevention and recycling program to divert solid waste. One of the other action projects would construct a waste-to-energy plant at Andersen AFB. Construction and operation of the facility would reduce the amount of material that would be landfilled. It is not possible to determine at this time how much MSW could be diverted to the WTE plant because planning for the plant has not been initiated. Contracts issued for construction activities would require the contractor to recycle construction and demolition debris to the maximum extent possible. The LOS for the intersection of Arc Light Boulevard and Highway 1 and Route 9 at the Main Gate would be LOS C or better during the peak hours of traffic. Traffic at the intersection of the Commercial Gate and Route 9 would operate at LOS B or better.

Table 4.13-2 Summary of Cumulative Impacts (*continued*)

Resource	Cumulative Impacts
Biological Resources	<p>Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. Under Alternative A and other actions, 122.7 hectares (303.2 acres) of vegetated land would be subject to removal, which represents 2.7 percent of the Refuge Overlay and the Ritidian Unit of the GNWR. Removal of habitat for ungulates and exotic predators would displace these species into adjacent habitats. The cumulative effects of noise on Mariana fruit bats and Mariana crows include periodic noise events from training activities in Northwest Field, as well as an incremental increase in aircraft overflights at Andersen main. No action of Alternative A or other actions would affect Area 50, or the proposed HMU; therefore, recovery efforts would not be affected. Because clearing activities and noise events occur in areas suitable for foraging and roosting/nesting for the Mariana fruit bat, Mariana crow, and potential habitat for recovery of other species, cumulative actions may affect listed species. Construction associated with the ASA project would impact a known female Mariana fruit bat foraging area. Therefore, clearing for the ASA project would represent an adverse effect. This forest removal would not jeopardize the continued existence of the Mariana fruit bat or adversely modify overall habitat.</p> <p>Conservation measures of Alternative A and other actions, however, reduce adverse effects. Under Alternative A and other actions, 336 hectares (830 acres) would be subject to ungulate exclosure fencing and ungulate depredation hunting. Of these 336 hectares (830 acres), Area 50 (22 hectares or 54 acres) and the new HMU (60 hectares or 148 acres) would be subject to exotic predator control with suitable exotic predator exclosure fencing. Conservation measures seek to create alternative habitat for Mariana fruit bats and Mariana crows by outplanting of foraging plots within exclosure areas. BTS control would be put into place at Pati Point, along with the 36 WI 32-7004 (100 percent inspection of outbound flights).</p> <p>Pursuant to §7 of the Endangered Species Act, the foreseeable cumulative effects would not result in any demonstrable adverse consequences.</p>
Groundwater Resources	<p>Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. Water withdrawal from the aquifer would increase by 1.15 percent and the resulting withdrawal would be 6.96 percent of the daily water withdrawn from the aquifer. The use of erosion control techniques and monitoring storm water during construction and after the projects are completed would minimize the potential for groundwater contamination.</p>
Earth Resources	<p>The types of construction activities associated with the other actions would be almost identical to those for Alternative A. Therefore, the discussion and analysis for Alternative A applies to the cumulative impact analysis.</p>
Hazardous Materials and Waste	<p>The construction contractor for other projects would be required to comply with the regulatory requirements identified for the No Action Alternative and Alternative A. Although some of the other actions may be adjacent to a project site under the No Action Alternative and Alternative A, use of regulatory requirements identified for these alternatives would minimize the potential for cumulative impacts. When completed, activities at the other facilities would be managed in accordance with applicable environmental plans and policies.</p>
Cultural Resources	<p>The ISR/Strike project is one of a number of other planned projects involving construction on Andersen AFB. The potential for cumulative impacts from the ISR/Strike and other actions is minimal based on the distance between project sites, especially for the Northwest Field project. Additionally, the Air Force accomplished the Section 106 process for the Northwest Field project. The potential for cumulative impacts between the ISR/Strike projects and other projects would be prevented or minimized through implementation of the procedures identified in the Andersen AFB ICRMP. When combining the other actions with the ISR/Strike project through the consultation process, no cumulative adverse effects on significant cultural resources, including visual resources, would occur.</p>

Table 4.13-2 Summary of Cumulative Impacts (*continued*)

Resource	Cumulative Impacts
Socioeconomic Resources	Alternative A has the potential for greater impacts than Alternative B and, therefore, only the summary for Alternative A is presented. On-Base population would increase by 4,248 personnel when considering military personnel, dependents, and students undergoing training. Off-Base population would temporarily increase for the duration of the construction activities because importing as many as 2,080 contract workers would be necessary due to the shortage of local labor on Guam. Nearly all the inventory of 484 off-Base units would be needed to meet the shortfall of 474 on-Base family housing units. The addition of as many as 765 elementary/middle school students to the existing enrollment would exceed the school capacity by about 543 students. The addition of as many as 185 high school students to the existing enrollment would exceed the school capacity by about 170 students. One of the ISR/Strike projects would construct a DoDEA high school, which would accommodate the additional high school students. Vacated space in the existing high school should be able to accommodate the additional elementary/middle school students. Should additional space be needed, portable buildings similar to those used by public school districts could be used to alleviate overcrowding. Employment generated by construction activities would result in wages paid, and increase expenditures for local and regional services and supplies during construction. The addition of 1,100 personnel authorizations would result in an increase in wages paid, business sales, and income to the local and regional economy.
Airfield Operations, Aircraft Safety, and Bird-Aircraft Strike Hazard	None of the other actions proposed at Andersen AFB include aircraft basing or airfield operations. Therefore, no cumulative airfield operations, aircraft safety, or bird/wildlife aircraft strike impacts would occur.
Environmental Justice	None of the other actions would have the potential for off-Base noise. Establishment and operation of the ISR/Strike capability, when combined with other planned projects, would not contribute cumulative impacts to minority or low-income populations in the area.

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CHAPTER 7 REFERENCES

- AFCEE 2003. Aircraft operations data for transient aircraft collected by HQ Air Force Center for Environmental Excellence in August 2003.
- AIHA 1986. *Noise and Hearing Conservation Manual*, 4th Ed. (Akron, AIHA), American Industrial Hygiene Association, 1986.
- AFSC 2006. Air Force Safety Center, USAF Wildlife Strikes by Altitude at Airports, http://afsafety.af.mil/SEF/Bash/web_alt_airfield.html, July 10, 2006.
- Andersen, *et al.* 1989. Andersen, D.E., O.J. Rongstad, and W.R. Mytton, Response of nesting red-tailed hawks to helicopter overflights. *Condor*, 91:296-299.
- Andersen AFB 1998. Andersen Air Force Base, Territory of Guam, *Air Installation Compatible Use Zone Report*, Vol 1, April 1998.
- Andersen AFB 2000. *Environmental Assessment, Andersen Air Force Base Cargo Parachute Drop Zone*, Department of the Air Force, Pacific Air Forces, 36th Air Base Wing, December 2000.
- Andersen AFB 2002. Department of the Air Force, *Draft Area 50 Restoration Project*, Andersen Air Force Base, Guam. 2002.
- Andersen AFB 2003a. Andersen Air Force Base Integrated Cultural Resource Management Plan, 2003-2007, 2003.
- Andersen AFB 2003b. *The United States Air Force Installation Restoration Program Final Management Plan for Andersen AFB Guam*, Andersen AFB, December 2003.
- Andersen AFB 2003c. Department of the Air Force, 36th Air Base Wing Civil Engineer Squadron, *Integrated Natural Management Resources Plan*, Andersen Air Force Base, Guam, December 2003.
- Andersen AFB 2004a. Economic Impact Statement, Andersen AFB, Guam FY04, undated.
- Andersen AFB 2004b. *Final Environmental Assessment, Proposed Construction of Army and Air Force Exchange Service New Shoppette*, Andersen Air Force Base, Guam, August 2004.
- Andersen AFB 2005a. Information on radon at Andersen AFB, http://www.atsdr.cdc.gov/HAC/PHA/andersen/and_p3.html, May 16, 2005.
- Andersen AFB 2005b. 8-year average bird-aircraft strike data for Andersen AFB provided by email from Mr. Jonathan Wald, 36 CES/CEV, June 30, 2005.
- Andersen AFB 2005c. Pilot Testing Resource Capability and Resource Valuation Assessment, Andersen Air Force Base, Guam, Final Report, October 2005.
- Andersen AFB 2006. Information concerning Philippine deer and feral pig depredation hunts provided in a comment by Andersen AFB after review of the DEIS, July 2006.
- Andren 1992. Corvid density and nest predation in relation to forest fragmentation: A landscape perspective. Andren, H., *Ecology* 73(3):794-804.
- ANSI 1983. American National Standards Institute, *American National Standard Specification for Sound Level Meters*, April 1983.
- ANSI 2002. American National Standards Institute, *New Classroom Acoustics Standard-ANSI S12.60-2002*, June 2002.
- Antrobus 2006. Email from Don Antrobus, Guam Water Works Chief Engineer, concerning NPDES permit for the Northern District WWTP, February 16, 2006.

- ATSDR 2002. Agency for Toxic Substances and Disease Registry, Public Health Assessment, Andersen Air Force Base, Yigo, Guam, January 4, 2002.
- Austin, Tsutsumi & Associates 2006. Austin, Tsutsumi & Associates, Inc., *Draft Traffic Impact Analysis Report New Visitor/Commercial Vehicle Gate, Andersen Air Force Base, Guam*, August 3, 2006.
- Baskerville 1985. Adaptive Management: Woody Availability and Habitat Availability. Baskerville, G., *Forestry Chronicle* 61: 171-175.
- Becker 2002. Response of wintering bald eagles to industrial construction in southeastern Washington. Becker, J.M., *Wildlife Society Bulletin* 30: 875-878.
- Bies and Hansen 1988. *Engineering Noise Control: Theory and Practice*, London: Unwin Hyman, pp. 36-37, 1988.
- Black and Veatch 2005. Black and Veatch Special Projects Corp., MEMORANDUM, AAFB Sanitary Landfill Options, August 2, 2005.
- Brooke 2005. U.S. Fish and Wildlife Service Guam National Wildlife Refuge, personal communication, A. Brooke, November 2005.
- Brooke 2006. U.S. Fish and Wildlife Service Guam National Wildlife Refuge, personal communication, A. Brooke, January 2006.
- Brown and Caldwell 2005. Brown and Caldwell, Function Analysis Concept Development, FY07 MILCON SAKW335780A, Upgrade of Northwest Field Infrastructure, Phase 1, Andersen Air Force Base, Guam, MI, Final Outbrief to Working Group, December 5, 2005.
- Busnel 1978. Busnel, R.G., Introduction. In *Fletcher, J.L. and R.G. Busnel*. Effects of noise on wildlife. Academic Press, New York.
- CCR 2004. Consumer Confidence Report, Andersen Air Force Base, Guam, January 1, 2004 – December 31, 2004.
- CERL 1978. United States Department of the Army, Construction Engineering Research Laboratory, *MicroBNOISE, A User's Manual, Technical Report N-86/12*, June 1978.
- Clark 2005. Personal communication with Bob Clark, 36 CES/CEV, concerning the dry wells that assist with stormwater migration to the aquifer, December 5, 2005.
- Cox and Elmqvist 2000. Cox, P.A. and T. Elmqvist. Pollinator extinction in the Pacific Islands. *Conservation Biology* 14:1237-1239.
- Cruz 2005a. Personal communication with Mr. Jack Cruz, 36 CES/CEO, concerning water production, system losses, and system capacity after the new wells are on-line, December 7, 2005.
- Cruz 2005b. Email from Mr. Mark Cruz, Environmental Protection Specialist, COMNAVREGMAR N042, concerning Navy projects on Guam that should be considered for cumulative impact purposes, December 20, 2005.
- Davis 1967. Ravens response to sonic bang. Davis, P, *British Birds* 60(9): 370-371.
- Davis 1983. Richard D. Davis, *Andersen Air Force Base Central Compound Reconnaissance Survey*. Department of Parks and Recreation, Government of Guam. Manuscript on file Guam Historic Preservation Office.
- Davis 1995. Margaret Davis, P.E., Butler Manufacturing Company, May 15, 1995.
- DeFant 2005. Personal communication between Mr. David DeFant and Mr. Marcus Grant, Geo-Marine, Inc., November 22, 2005.
- Delaney, et al 1999. Effects of helicopter noise on Mexican spotted owls. Delaney, D.K., T.G. Grubb, P. Beier, L.L. Pater, and M.H. Reiser. *Journal of Wildlife Management* 63:60-76.+
- Dicke 2006. Guam Department of Agriculture, Division of Aquatic and Wildlife Resources, B. Dicke, personal communication January 2006.

- Donnegan, *et al.* 2004. Donnegan, J.A. S.L. Butler, W. Grabowiecki, B.A. Hiserote, D. Limtiaco. Forest Resources of Guam. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- Engeman, *et al.* 1998. Engeman, R.M., D.V. Rodriquez, M.A. Linnell, and M.E. Pitzler. A review of the case histories of the brown tree snakes (*Boiga irregularis*) located by detector dogs on Guam. *International Biodeterioration and Biodegradation* 42: 161-165.
- Engeman and Vice 2001. Engeman, R.M. and D.S. Vice. Objectives and Integrated Approaches for the Control of Brown Tree Snakes. *Integrated Pest Management Reviews* 6:59-76.
- Exon 2005. Personal communication with Gary Exon, 36 CES/CEO), concerning wastewater generation, December 7, 2005.
- Fancy, *et al.* 1999. Status of the Mariana Crow population on Rota, Mariana Islands. Fancy, S.G., M.R. Lusk, and D.J. Grout. *Micronesica* 32(1): 3-10.
- FICAN 2000. Federal Interagency Committee on Aviation Noise, *FICAN Position on Research into Effects of Aircraft Noise on Classroom Learning*, September 2000.
- FICUN 1980. Federal Interagency Committee on Urban Noise, *Guidelines for Considering Noise in Land Use Planning and Control*, New Jersey, D.C.: U.S. Government Printing Office, 1980.
- Fidell, *et al.* 1988. Fidell, S., T.J. Schultz, and D.M. Green 1988. A Theoretical Interpretation of the Prevalence Rate of Noise-Induced Annoyance in Residential Populations, *Journal of the Acoustical Society of America*, 84(6), 1988.
- FLIP 2005. DoD Flight Information Publication (Enroute) Supplement Pacific, Australia, and Antarctica, May 12, 2005.
- Fosberg 1960. The vegetation of Micronesia. General descriptions, the vegetation of the Marianas Islands, and a detailed consideration of the vegetation of Guam, F.R. Fosberg. *Bulletin of the American Museum of Natural History*. 119(1): 55-75.
- Frericks *et al* 1980. R.R. Frericks, "Los Angeles Airport Noise and Mortality: Faulty Analysis and Public Policy," *Am J. Public Health*, 357-362, April 1980.
- Fritts and Rodda 1998. Fritts, T. H. and G. H. Rodda. The role of introduced species in the degradation of island ecosystems: A case history of Guam. *Annual Review of Ecology and Systematics*: 29: 113-140.
- Gingras 2005. Solid waste information provided in interview with Lt Jim Gingras, 36 CES/CEV solid waste manager, on March 29, 2005.
- GovGuam 1999. Endangered Species Act of Guam: 5 Guam Code, Chapter 63, Article 2.
- GovGuam DAWR 1999. Government of Guam, Division of Aquatic & Wildlife Resources. Establishment of populations of Endangered Species in Snake Free Areas. FY 1999 Report. Period covered: October 1, 1998 to September 30, 1999. (also located at: <http://www.guamdawr.org/reports/fy99/99RailsArea50.pdf>).
- GovGuam DAWR 2000a. Government of Guam, Division of Aquatic & Wildlife Resources. Determination of current population size and distribution of Guam Deer. FY 1999 Report. Period covered: October 1, 1998 to September 30, 1999, (also located at: <http://www.guamdawr.org/reports/fy99/99Deer.pdf>).
- GovGuam DAWR 2000b. Government of Guam, Division of Aquatic & Wildlife Resources. Establishment of a Guam Rail population at Area 50, Northwest Field, Andersen AFB. FY 2000 Report. Period covered: October 1, 1999 to September 30, 2000. (also located at: http://www.guamdawr.org/reports/fy00/FY00_NWFRails.pdf).

- GovGuam DAWR 2005. Endangered Species Regulation Number 7. Guam Code, Title 5, Division 6, Section 63205(c). (also located at: http://www.guamattorneygeneral.com/guam_code_Title5.php).
- GovGuam HRD 2005. Government of Guam, Department of Parks and Recreation, Historic Resources Division. *Guam and National Register* (listing of historic sites on Guam) downloaded from <http://www.admin.gov.gu/dpr/hrdhome.html> (file available at <http://www.admin.gov.gu/dpr/pdf/register.pdf>) May 17, 2005.
- Guam EPA 2006. Guam Environmental Protection Agency, *CNMI and Guam Stormwater Management Manual, Volumes I and II*, Draft, April 2006.
- GWA 2006. Guam Waterworks Authority, Draft Guam Water Resources Master Plan, Volumes 1, 2, and 3, May 2006.
- Haun 1989. *Archaeological Reconnaissance Survey of Relocatable Over-the-Horizon Radar Site P-233, Territory of Guam, Mariana Islands, Micronesia*. Prepared for Wilson Okamoto and Associates, Inc., P.H. Rosendahl, Ph.D. Inc., Hilo, Hawaii.
- Higgins 1974. The response of songbirds to the seismic compression waves preceding sonic booms. Higgins, T.H. Federal Aviation Administration Report AD-780-050. 21pp.
- Holling 1978. Adaptive environmental assessment and management. John Wiley, New York, New York, USA, J.C. Holling, ed.
- Hopper and Smith 1992. Status of tree snails (*Gastropoda: Partulidae*) on Guam, with a resurvey of sites studied by H. E. Crampton in 1920. Hopper, D.R. and B.D.Smith. *Pacific Science* 46: 77-85.
- IIARI 2004. *Final Archaeological Overview Survey Report for Andersen Air Force Base, Guam*. By Sandra Lee Yee, M.A., David J. Welch, Ph.D., and Jane Allen, Ph.D. Under Prime Contract Number F41624-01-D-8597/0061 to Earth Tech, Inc. International Archaeological Research Institute, Inc. November.
- IIARI 2004. *Final Archaeological Overview Survey Report for Andersen Air Force Base, Guam*. By Sandra Lee Yee, M.A., David J. Welch, Ph.D., and Jane Allen, Ph.D. Under Prime Contract Number F41624-01-D-8597/0061 to Earth Tech, Inc. International Archaeological Research Institute, Inc. November.
- Janeke 2005. University of Guam Masters Degree Student, D. Janeke, personal communication November 2005.
- Janeke 2006. University of Guam Masters Degree Student, D. Janeke, personal communication January 2006.
- Knutson and Vogt 2002. Knutson, K. and S. Vogt. Philippine Deer (*Cervus mariannus*) and feral pig (*Sus scrofa*) population sampling in the secondary limestone forests of northern Guam. Report for Andersen Air Force Base, U.S. Fish and Wildlife Service, Environmental Office, Andersen Air Force Base, Guam and Guam National Wildlife Refuge.
- Koay, *et al.* 1998. Koay, G., Heffner, R.S., and Heffner, H.E. Hearing in a megachiropteran fruit bat, *Rousettus aegyptiacus*. *Journal of Comparative Psychology* 112, 371-382.
- Krieg 2005. Honorable Kenneth J. Krieg, Under Secretary of Defense. Letter dated November 7, 2005, to Senator Daniel K. Inouye, and Congressmen Neil Abercrombie and Ed Case.
- Krieg 2005. Honorable Kenneth J. Krieg, Under Secretary of Defense. Letter dated November 7, 2005, to Senator Daniel K. Inouye, and Congressmen Neil Abercrombie and Ed Case.

- Kurashina, *et al.* 1987. Kurashina, Hiro, D. Moore, O. Kataoka, R. Clayshulte, and E. Ray. *Archaeological Survey of Areas 1, 2, 1-A, and 2-A at Northwest Field, Andersen Air Force Base and Naval Communication Area Master Station Western Pacific, Finegayan, Guam*. Prepared for Department of the Navy, Pacific Division, Naval Engineering Command. Manuscript on file Guam Historic Preservation Office.
- Lawrence 2005. Holom Tamo, LLC. J. Lawrence, personal communication November 2005.
- Lee 1985. Common Weeds of Guam. C.T. Lee. Guam Agricultural Experiment Station, University of Guam.
- Lee 2006. Email from Mr. Mike Lee, USEPA Region 9 environmental engineer, concerning the GWA WWTP, January 17, 2006.
- Lujan 1996. Nest site characteristics of the Endangered Mariana Crow (*Corvus kubaryi*) on Guam. Dana Lujan, Unpublished manuscript, Oregon State University.
- Lujan 2005. Andersen AFB, 36 CEV/CEVN. Personal communication, Dana Lujan, 2005.
- Marler 2006. Email from Thomas Marler to Jonathan Wald, 36 CES/CEV, containing information on *Tabernaemontana rotensis* on Andersen AFB, February 2, 2006.
- Mason Architects 2004. *Historic Building and Associated Landscape/Viewsheds Inventory and Evaluation for Andersen Air Force Base. 2004 Update*. Contract No. F41624-03-M-8912. Prepared by Mason Architects, Inc. September.
- Meacham and Shaw 1979. W.C. Meacham and N. Shaw, "Effects of Jet Noise on Mortality Rates," British J. Audiology, 77-80, August 1979.
- Monecke 2006. Andersen AFB wastewater generation data provided in email from Charles Monecke, 36 CES/CEOE, July 10, 2006.
- Moore 2005. Cycad scale, *Aulacaspis yasumatsui* (Homoptera: Diaspididae). Moore, A., Micronesian Invasive Insect Survey website. Also available at: <http://www.micronesianinsects.com/IIR/2004.03.htm>
- Moore and McMakin 2005. Moore, P.H. and P. McMakin. Plants of Guam. Revisions and web version by J. McConnell. Also found at www.uog.edu/cals/site/pog/poghome.htm.
- Morton 1996. Morton, J.M. The effects of aircraft overflights on endangered Mariana crows and Mariana fruit bats at Andersen Air Force Base, Guam. Technical report prepared by the U. S. Fish and Wildlife Service for the Department of the Navy. 81pp.
- Morton, *et al.* 2000. Morton, J. M., F. A. Amidon, L. R. Quinata. Structure of a Limestone Forest on Northern Guam. Micronesia 32: 229-244.
- Nagel, *et al.* 2002. Nagel, J. C. and J. B. Ruhl. *The Law of Biodiveristy and Ecosystem Management*. Chapter 7. Florida State University College of Law.
- Navy 1996. *Final Report. Cultural Resources Management Plan. Andersen Air Force Base, Mariana Islands, Territory of Guam*. Submitted to Department of the Navy, Pacific Division, Naval Facilities Engineering Command, Pearl Harbor, Hawaii. Prepared by Ogden Environmental and Energy Services Co., Inc. Honolulu, Hawaii. By Allan J. Schilz, M.A. Contract No. N62742-91-0507, Delivery Order No. 005. May.
- Ostil 2006a. Andersen AFB energy consumption information provided via email from Jonathan Ostil, Contractor, PACAF/CEVA, March 6, 2006.
- Ostil 2006b. Email from Mr. Jonathan Ostil, Contractor, PACAF/CEVA, containing aircraft flight data for fuel consumption, January 17, 2006.
- PACAF 2005. HQ PACAF Northwest Field Site Activation trip report, April 22, 2005.

- Parsons 2005. Meeting Minutes, EIAP for Aircraft Basing and Operation at Andersen AFB, Guam, December 5-8, 2005.
- Parsons 2006. Field Studies Survey Report for Vegetation Community Mapping, Andersen AFB. March 2005.
- Perry and Morton 1999. Perry, G. and J.M. Morton. Regeneration rates of the woody vegetation of Guam's Northwest Field following major disturbance: land use patterns, feral ungulates, and cascading effects for the brown tree snake. *Micronesia* 31: 125-142.
- Plentovich, *et al.* 2005. Population trends of Mariana Crow *Corvus kubaryi* on Rota, Commonwealth of the Northern Mariana Islands. Plentovich, S., J.M. Morton, J. Bart, R.J. Camp, M. Lusk, N. Johnson, and E. Vanderwerf. *Bird Conservation International* 15: 211-224.
- Quinata 1994. Quinata, L.R., Vegetation Baseline Survey – Andersen Air Force Base, Guam. Prepared for U.S. Fish and Wildlife Service.
- Raulerson and Rinehart 1991. Trees and Shrubs of the Northern Mariana Islands. Raulerson, L. and A. Rinehart. Coastal Resources Management, Office of the Governor, Commonwealth of the Northern Mariana Islands, Saipan, Northern Mariana Islands.
- Ringold 1996. Ringold, P. L. *Adaptive Management Design for Ecosystem Management*. Ecological Applications. Volume 6, p. 745.
- Rodda, *et al.* 1999. An overview of the biology of the Brown tree snake (*Boiga irregularis*), a costly introduced pest on Pacific Islands. Rodda, G.H., T.H. Fritts, M.J. McCoid, and E.W. Campbell, III. Pages 44-80 in Rodda, G.H., Y. Sawai, D. Chiszar, and H. Tanaka (eds.) *Problem Snake Management: The habu and the brown tree snake*. Cornell University Press, Ithaca, NY.
- Ruhl 2004. Ruhl, J. B. *Taking Adaptive Management Seriously for the Endangered Species Act—Lots or Talk, Little Action*. Public Law and Legal Theory Working Paper Number 101. Florida State University College of Law.
- Savidge 1987. Savidge, J.A. Extinction of an island forest avifauna by an introduced snake. *Ecology* 68:660-668.
- Schreiner 1997. Schreiner, I.H. Demography and recruitment of selected trees in the Limestone forest of Guam in relation to introduced ungulates. *Micronesia* 30(1): 169-181.
- Schultz 1978. Schultz, T.J. *Synthesis of Social Surveys on Noise Annoyance*, Journal of the Acoustical Society of America, pp. 377-405, 1978.
- Sherrill 2005. Information on aircraft washracks and clear water rinse facility provided via email from Mr. Dan Sherrill, 36 CES/CECB, December 14, 2005.
- Sherrill 2006a. Email from Mr. Dan Sherrill, 36 CES/CECB, containing information on the GPA electrical generation system, March 2, 2006.
- Sherrill 2006b. Email from Mr. Dan Sherrill, 36 CES/CECB, containing information on wastewater flow characteristics and landfill leachate, February 20, 2006
- Space and Falanruw 1999. Space, J.C. and M. Falanruw. Observations on invasive plant species in Micronesia. Prepared for the Meeting of the Pacific Islands Committee, Council of Western State Foresters, Majuro, Republic of the Marshall Islands, February 22-26, 1999.
- Speakman 1992. J. Speakman, Air Force Systems Command, Armstrong Laboratory, Wright-Patterson AFB, Ohio, 1992.
- Spoerer 2006. Email from Mr. William Spoerer, 36 CES/CEVQ, with notes from meeting with Guam EPA solid waste personnel concerning the Andersen AFB landfill and the planned GovGuam landfill, September 19, 2006.

- Suthers and Summers 1980. Suthers RA, Summers CA, Behavioral audiogram and. masked thresholds of the megachiropteran echolocating bat, *Rousettus*. Journal of Comparative Physiology 136:227–233.
- Tobin, *et al.* 1999. Nightly and seasonal movements of *Boiga irregularis* on Guam. Tobin, M.E., R.T. Sugihara, R.A. Pochop, and M.A. Linnell Journal of Herpetology 33: 281-291.
- Tobin, *et al* 1999. Nightly and seasonal movements of *Boiga irregularis* on Guam. Tobin, M.E., R.T. Sugihara, R.A. Pochop, and M.A. Linnell. Journal of Herpetology 33: 281-291.
- Tomback 1986. Tomback, D.F. Observations on the behavior and ecology of the Mariana Crow. Condor 88:398-401.
- Torres 2006. Email from Louis Torres, 36 CES/CEC, containing information on the estimated completion date for the water supply system replacement, August 8, 2006.
- TRIMS 2004. Report Control Symbol: CINCPACFLTINST 3624.1G, *Target and Range Information Management System (TRIMS) Annual Report FY03 for the Pacific Fleet*, February 1, 2004.
- Tuggle 1993. Small and Developed Parcel Survey Areas (Andersen Air Force Base). In Jammes Carucci, *The Archaeology of Orote Peninsula*. Prepared for Belt Collins & Associates, Honolulu.
- TWRI 2002. Texas Water Resources Institute, *Efficient Water Use for Texas: Policies, Tools, and Management Strategies*, September 2002.
- USACE 1976. U.S. Army Corps of Engineers, Development of Predictive Criteria for Demolition and Construction Solid Waste Management, October 1976.
- USAF 1978. Departments of the Air Force, the Army, and the Navy, AFM 19-10, TM 5-803-2, NAVFAC P-970, *Environmental Protection, Planning in the Noise Environment*, June 15, 1978.
- USAF 1998. United States Air Force, *Environmental Assessment for Military Family Housing Construction Project, Columbus Air Force Base, Mississippi*, June 1998.
- USAF 1999. United States Air Force Air Installation Compatible Use Zone (AICUZ) *Program Manager's Handbook*, March 1, 1999.
- USAF 2000. United States Air Force. 2000. Environmental Assessment: Andersen Air Force Base Cargo Parachute Drop Zone. 103pp.
- USAF 2002. Flyover Noise Calculator, Version 1.0.2, beta, USAF/AFRL/HECB, Wright-Patterson AFB, OH, May 2002.
- USAF 2003a. United States Air Force, *Program Review of Infrastructure Assessment and Water System Maintenance at Andersen AFB, Guam*, November 19, 2003.
- USAF 2003b. United States Air Force, *Utility System Assessment, Andersen AFB, Guam*, September 2003.
- USAF 2003c. United States Air Force, Air Force Safety Center, USAF Wildlife Strikes by Phase of Flight, http://safety.kirtland.af.mil/AFSC/BASH/stats/web_pof_stat.html, January 29, 2003.
- USAF 2003d. United States Air Force, Air Force Safety Center, USAF Wildlife Strikes by Altitude, (low-level/ranges), http://safety.kirtland.af.mil/AFSC/BASH/stats/web_alt_ll.html, January 29, 2003.
- USAF 2004a. United States Air Force, *Andersen AFB Water and Sewerage Assessment and Pertinent Information*, Andersen AFB, Guam, June 19, 2004.
- USAF 2004b. United States Air Force, *Proposed Construction of Army and Air Force Exchange Service New Shopette*, Andersen AFB, Guam, August 2004.
- USAF 2004c. United States Air Force, *Andersen AFB, Power and Communications Utilities Assessment Overview*, June 2004.
- USAF 2004d. United States Air Force, *Infrastructure Program Review of Electrical Distribution System at Andersen AFB, Guam*, May 28, 2004.

- USAF 2005a. United States Air Force, Information on water and wastewater use and generation provided via email by Mr. Jon Ostil, PACAF/CEVA, May 11, 2005.
- USAF 2005b. United States Air Force Safety Center, Air Force Safety Analysis 1993-2002, <http://afsafety.af.mil>, August 1, 2005.
- USAF 2005c. 2003 Mobile Source Air Emissions Inventory and 2003 Stationary Sources Air Emissions Inventory for Andersen AFB, Guam, February 2005.
- USAF 2006. 36th Wing Instruction, *Brown Tree Snake Management*, by order of the Commander, 36th Wing (PACAF); 15 January 2006.
- USCB 2005. Population data obtained from the U.S. Census Bureau (IDB Data Access) downloaded from <http://www.census.gov/population/www/cen2000/islandareas.html> on December 9, 2005.
- USDOC 2000. U.S. Department of Commerce, Bureau of Economic Analysis, Time Series Data, 2000.
- USDOC 2001. U.S. Department of Commerce, Bureau of Economic Analysis, Time Series Data, 2001.
- USEPA 1974. United States Environmental Protection Agency, *Protective Noise Levels, Condensed Version of EPA Levels Document*, March 1974.
- USEPA 1992. United States Environmental Protection Agency, *A Citizen's Guide to Radon*, May 1992.
- USEPA 1998a. United States Environmental Protection Agency, *Biological Effects of Ionizing Radiation (BEIR) VI Report: "The Health Effects of Exposure to Indoor Radon,"* <http://www.epa.gov/iaq/radon/public.html>, June 9, 1998.
- USEPA 1998b. United States Environmental Protection Agency, *Radon Resistant New Construction (RRNC)*, <http://www.epa.gov/iedweb00/construc.html>, June 9, 1998.
- USEPA 2004. United States Environmental Protection Agency, Map of Radon Zones, www.epa.gov/iaq/radon/zonemap.html, April 29, 2004.
- USEPA 2005. USEPA water consumption rates, Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Guam.
- USEPA 2006a. Information on diesel exhaust from <http://www.epa.gov/ne/eco/airtox/diesel.html>, July 15, 2006.
- USEPA 2006b. United States Environmental Protection Agency, *Comments received from agency on Draft Environmental Impact Statement, Establishment and Operations of an Intelligence, Surveillance, Reconnaissance (ISR), and Strike Capability*, Andersen Air Force Base, Guam, June 27, 2006.
- USFWS 1984. Endangered and Threatened Wildlife and Plants; Determination of Endangered Species Status for Seven Birds and Two Bats of Guam and the Northern Mariana Islands. Fed. Reg. 49:33881-33885.
- USFWS 1987. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for *Serianthes nelsonii*, Merr. (Hayun Lagu or Tronkon Guafi). *Federal Register* 52 (32): 4907 – 4910.
- USFWS 1989. Endangered and Threatened Wildlife and Plants; Determination of Experimental Population Status for an Introduced Population of Guam Rails on Rota in the Commonwealth of the Northern Mariana Islands. *Federal Register* 54 (208): 43966-43970.
- USFWS 1990a. Native forest birds of Guam and Rota of the commonwealth of the Northern Mariana Islands Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. (Also available at: http://ecos.fws.gov/docs/recovery_plans/1990/900928.pdf).
- USFWS 1990b. Mariana Fruit Bat (Guam Population) and Little Mariana Fruit Bat Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon.
- USFWS 1994. Recovery plan for *Serianthes nelsonii*. U.S. Fish and Wildlife Service, Pacific Region.

- USFWS 1998. United States Fish and Wildlife Service and National Marine Fisheries Service, *Endangered Species Consultation Handbook, Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act*, March 1998.
- USFWS 2000. Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for Three Plants from the Mariana Islands and Guam. *Federal Register* 65 (106): 35025 – 35033.
- USFWS 2002. Endangered and Threatened Wildlife and Plants; Review of Species that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petitions; Annual Description of progress on listing actions. *Federal Register* 67 (114): 40657-40679.
- USFWS 2004a. Endangered and Threatened Wildlife and Plants; Proposed endangered status for three plants from the Mariana Islands and Guam. *Federal Register* 69 (6):1560 - 1561.
- USFWS 2004b. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Mariana Fruit Bat and Guam Micronesian Kingfisher on Guam and the Mariana Crow on Guam and in the Commonwealth of the Northern Mariana Islands. *Federal Register* 69 (208):62944 - 62990.
- USFWS 2004c. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status and Prudency Determination for Designation of Critical Habitat for Two Plant Species from the Commonwealth of the Northern Mariana Islands. *Federal Register* 69 (68): 18499 – 18507.
- USFWS 2004d. Draft Revised Recovery Plan for the Sihek or Guam Micronesian Kingfisher (*Halcyon cinnamomina cinnamomina*). Region 1, U.S. Fish and Wildlife Service, Portland, Oregon.
- USFWS 2005a. Endangered and Threatened Wildlife and Plants; Mariana Fruit Bat (*Pteropus mariannus mariannus*): Reclassification from Endangered to Threatened in the Territory of Guam and Listing as Threatened in the Commonwealth of the Northern Mariana Islands. *Federal Register* 70 (4):1190 - 1210.
- USFWS 2005b. Draft Revised Recovery Plan for the Aga or Mariana Crow (*Corvus kubaryi*). U.S. Fish and Wildlife Service, Portland, Oregon.
- USFWS 2006. United States Department of the Interior, Fish and Wildlife Service, Biological Opinion on the Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability Project on Andersen Air Force Base, Guam, October 3, 2006.
- USGS 2003. United States Geological Survey, *Hydrologic Resources of Guam, U.S. Geological Survey Water-Resources Investigations Report 03-4126*, prepared in cooperation with the Water and Environmental Research Institute (WERI) University of Guam, 2003.
- USPACOM 1999. United States Pacific Command, *Environmental Impact Statement Military Training in the Marianas*, June 1999.
- Vice 2005. U. S. Department of Agriculture, Wildlife Services. Personal communication, D. Vice, 2005.
- Vice, *et al.* 2004. Summary to Guam's Outbound Cargo Handling Process: Preventing the spread of the Brown Treesnake. Vice, D.S., M.A. Linnell, and M.E. Pitzler Draft Report, U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Guam.
- VonGierke 1990. H.R. Von Gierke, "The Noise-Induced Hearing Loss Problem," NIH Consensus Development Conference on Noise and Hearing Loss, Washington D.C., 22-24 January 1990.
- Wald 2006. Information on sightings of Micronesian starling on Andersen AFB provided by Mr. Jonathan Wald, 36 CES/CEV, in a comment from review of the EIS, October 26, 2006.
- Walters 1986. Adaptive management of renewable resources. Walters, C.J. McMillan, New York, New York..
- WastAway 2006. WastAway Services, A Resource Recycler, <http://www.wastaway.com>, October 5, 2006.

- Wiles 1986. Current research and future management of Marianas Fruit Bats (*Chiroptera Pteropodidae*) on Guam. G.J. Wiles. *Aust. Mammal* 10: 93-95.
- Wiles 1994. The flying fox trade: a new dilemma. G.J. Wiles. *Bats Magazine* 12:15-18. Published by Bat Conservation International.
- Wiles 2005. Decline of a population of wild seeded breadfruit (*Artocarpus mariannensis*) on Guam, Mariana Islands. G.J. Wiles. *Pacific Science* 59: 509-522.
- Wiles, *et al.* 1995. The status and distribution of endangered animals and plants in northern Guam. Wiles, G.J., C.F. Aguon, G.W. Davis, and D.J. Grout. *Micronesia* 28(1):31-49.
- Wiles, *et al.* 2003. Impacts of the Brown Tree Snake: Patterns of decline and species persistence in Guam's Avifauna. Wiles, G.J., J. Bart, R.E. Beck, Jr., and C.F. Aguon. *Conservation Biology* 17: 1350-1360.
- Yee, *et al.* 2004. Final Archaeological Overview Survey Report for Andersen Air Force Base, Guam. Manuscript on file Guam Historic Preservation Office.

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**Final Environmental Impact Statement
Establishment and Operation of an
Intelligence, Surveillance,
Reconnaissance, and Strike Capability
Andersen Air Force Base, Guam
Volume II Appendices**



**Department of the Air Force
Pacific Air Forces
Hickam Air Force Base, Hawaii
November
2006**



**FINAL
ENVIRONMENTAL IMPACT STATEMENT
ESTABLISHMENT AND OPERATION OF AN INTELLIGENCE,
SURVEILLANCE, RECONNAISSANCE, AND STRIKE CAPABILITY
ANDERSEN AIR FORCE BASE, GUAM**

**VOLUME 2
APPENDICES**

**DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES
HICKAM AIR FORCE BASE, HAWAII**

NOVEMBER 2006



Printed on recycled paper

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ACRONYMS AND ABBREVIATIONS

$\mu\text{g}/\text{m}^3$	microgram(s) per cubic meter
36 WI 32-7004	36th Wing Instruction 32-7004, <i>Brown Tree Snake Management</i>
AFB	Air Force Base
AFI	Air Force Instruction
AGE	aerospace ground equipment
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
ANSI	American National Standards Institute
AOC	area of concern
APE	area of potential effects
APZ	accident potential zone
AQCR	air quality control region
ASA	aircraft staging area
ATCAA	air traffic control assigned airspace
ATSDR	Agency for Toxic Substances and Disease Registry
BA	biological assessment
BAI	backup aircraft inventory
BASH	Bird/Wildlife Aircraft Strike Hazard
bgs	below ground surface
BO	Biological Opinion
BOD ₅	5-day biochemical oxygen demand
BRAC	Base Realignment and Closure Commission
BSP	Bureau of Statistics and Plans
BTS	brown tree snake
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CITS	Combat Information Transport System
CNMI	Commonwealth of the Northern Mariana Islands
CRMA	cultural resource management area
CY	cubic yard
CZ	clear zone
CZMA	Coastal Zone Management Act
DAWR	Guam Department of Agriculture Division of Aquatic and Wildlife Resources
dB	decibel
dBA	A-weighted sound level measured in decibels
DNL	day-night average sound level
DoD	Department of Defense
DoDEA	Department of Defense Education Activity
DRMO	Defense Reutilization Marketing Office

EA	environmental assessment
EIAP	environmental impact analysis process
EIFS	Economic Impact Forecast System
EIS	environmental impact statement
EO	executive order
EOD	explosives ordnance disposal
EPP	Environmental Protection Plan
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDM	Farallon de Medinilla
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
ft ²	square foot
FY	fiscal year
GBU	Guided Bomb Unit
GBU	guided bomb unit
GCMP	Guam Coastal Management Program
GNWR	Guam Natural Wildlife Refuge
GOV	government-owned vehicle
GovGuam	Government of Guam
GPA	Guam Power Authority
gpd	gallons per day
gpm	gallons per minute
GPS	global positioning system
Guam EPA	Guam Environmental Protection Agency
GWA	Guam Waterworks Authority
HAP	hazardous air pollutant
HMU	habitat management unit
HSC-25	Helicopter Combat Support Squadron 25
HUD	United States Department of Housing and Urban Development
ICRMP	Integrated Cultural Resources Management Plan
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
ISR	intelligence, surveillance, and reconnaissance
JDAM	Joint Direct Attack Munition
kV	kiloVolt
kWH	kiloWatt-hours
L _{max}	maximum sound level
LOS	level of service
Marianas Training EIS	<i>Military Training in the Marianas Environmental Impact Statement</i>

mgd	million gallons per day
MILCON	military construction
MOA	military operations area
MOU	Memorandum of Understanding
MSA	munitions storage area
MSL	mean sea level
MSW	municipal solid waste
MTR	military training range
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLR	noise level reduction
NM	nautical mile
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O&M	operations and maintenance
PAA	primary assigned aircraft
PACAF	Pacific Air Forces
pCi/L	picoCuries per liter
PL	public law
POV	privately owned vehicle
ppm	parts per million
PSD	prevention of significant deterioration
QDR	Quadrennial Defense Review
RAIF	resource adverse impact footprint
RCRA	Resource Conservation and Recovery Act
RED HORSE	Rapid Engineer Deployable Heavy Operational Repair Squadron Engineer
RTV	rational threshold value
SDB	Small Diameter Bomb
SEL	sound exposure level
GSHPO	Guam State Historic Preservation Office
SWMU	solid waste management unit
SWPPP	Storm Water Pollution Prevention Plan
T&E	threatened and endangered
TALCE	Transportable Airlift Control Element
the Base	Andersen AFB
TMDL	Total Maximum Daily Loads
tpd	tons per day
tpy	tons per year
TRIMS	Training Range Information Management System

U.S.	United States
UCLA	University of California at Los Angeles
UIC	underground injection control
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USC	U.S. Code
USDA	U.S. Department of Agriculture
USDOC	U.S. Department of Commerce
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UXO	unexploded ordnance
WTE	waste-to-energy
WWTP	wastewater treatment plant

APPENDIX A INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

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INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

Air Force Instruction (AFI) 32-7060, *Interagency and Intergovernmental Coordination for Environmental Planning*, provides the procedures to comply with applicable federal, state, and local directives for Interagency and Intergovernmental Coordination for Environmental Planning (IICEP). The AFI implements the following:

- Air Force Planning Document 32-70, *Environmental Quality*;
- Department of Defense (DoD) Directive 4165.61, *Intergovernmental coordination of DoD Federal Development Programs and Activities*;
- Executive Order 12372, *Intergovernmental Review of Federal Programs*;
- Title IV of the *Intergovernmental Coordination Act (ICA) of 1968*; and
- Section 204 of the *Demonstration Cities and Metropolitan Development Act of 1966*.

Section 401(b) of the ICA states that, “All viewpoints-national, regional, state, and local...will be fully considered...when planning Federal or federally assisted development programs and projects.” To comply with the IICEP, the Air Force briefed the following agencies: United States Fish and Wildlife Service (USFWS) in Honolulu, Hawaii on December 13, 2004; the USFWS Guam National Wildlife Refuge Manager in Guam on December 15, 2004; and the Government of Guam Division of Aquatic and Wildlife Resources on June 9, 2005.

The Air Force accomplished Section 7 consultation with the USFWS (see Appendix E) and Section 106 consultation with the Guam State Historic Preservation Office (see Appendix D).

The federal *Coastal Zone Management Act* The Air Force requires a Coastal Zone Management Consistency Determination. Andersen AFB submitted a Coastal Zone Management Assessment form to the Government of Guam Bureau of Statistics and Plans (BSP), the lead agency for the Guam Coastal Management Program (GCMP), for the federal agency consistency review on August 30, 2006. The BSP, in a September 22, 2006 letter, concurred that the ISR/Strike project will be undertaken in a manner consistent with the objectives and enforceable policies of the GCMP to the maximum extent practicable and in accordance with Public Laws 92-583 and 94-370. This appendix contains the Coastal Zone Management Assessment form and the BSP response letter.

The draft EIS was submitted to federal and GovGuam agencies for review. Appendix B contains the comments received from agency review and the responses to the comments.

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DEPARTMENT OF THE AIR FORCE
WASHINGTON, DC

AUG 26 2005

Office of the Assistant Secretary

MEMORANDUM FOR DEPUTY ASSISTANT SECRETARY OF THE NAVY
(ENVIRONMENT)

FROM: SAF/IEE
1665 Air Force Pentagon
Washington, DC 20330-1665

SUBJECT: Cooperating Agency Request for the Proposed Basing of Intelligence, Surveillance, Reconnaissance, Strike (ISR/Strike) Force at Andersen Air Force Base (AFB), Guam

The Air Force requests your formal participation, as prescribed in the President's Council on Environmental Quality National Policy Act (NEPA) Regulations, 40 CFR 1501.6, *Cooperating Agencies*, in preparation of an environmental impact statement (EIS) for the proposed basing of ISR/Strike Force at Andersen AFB.

As a cooperating agency, the Air Force requests you participate in various portions of the EIS development as may be required. Specifically, the Air Force asks for your support as a cooperating agency by:

- Assuming responsibility, upon request by the Air Force, for developing information and preparing analyses on issues of which you have special expertise;
- Making staff support available to enhance interdisciplinary review capability; and
- Responding, in writing, to this request.

The Air Force requires that the support of cooperating agencies be timely, to avoid unnecessary delays in the NEPA process. Should you or your staff have further questions regarding this memo, our points of contact are Lt Col Rowene Lant, PACAF/CEVA, DSN 315-448-0470, rowene.lant@hickam.af.mil, and Ms Patricia Vokoun, AF/ILEPB, DSN 664-5263, patricia.vokoun@pentagon.af.mil.

RICHARD A. ASHWORTH, Col, USAF
Acting Deputy Assistant Secretary of the Air Force
(Environment, Safety, and Occupational Health)

cc:
AF/ILEPB



DEPARTMENT OF THE NAVY
OFFICE OF THE ASSISTANT SECRETARY
(INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON, D.C. 20350-1000

SEP 16 2005

MEMORANDUM FOR ACTING DEPUTY ASSISTANT SECRETARY OF THE AIR
FORCE (ENVIRONMENT, SAFETY AND OCCUPATIONAL
HEALTH)


SUBJECT: Cooperating Agency Request

This is in response to your memo of 26 August 2005 requesting that the Navy participate in the preparation of an Environmental Impact Statement (EIS) for the Proposed Basing of Intelligence, Surveillance, Reconnaissance, Strike Force at Andersen Air Force Base (AFB), Guam. The Navy agrees to serve as a cooperating agency with the Air Force in this environmental planning process.

The Navy's point of contact to support the Air Force and to establish parameters for Navy participation in the EIS as a cooperating agency is Mr. Anthony Hoover, Environmental Program Director, Commander, Naval Marianas. Mr. Hoover's mailing address is: COMNAVMARIANAS, PSC 455, Box 152, FPO AP 96540-1000. He may also be reached at (617)339-8181 hoovera@guam.navy.mil.

The Navy appreciates being afforded the opportunity to participate as a cooperating agency and looks forward to working with the Air Force on this very important planning effort. Please let me know if I can be of further assistance.

Sincerely,


Donald R. Schregardus
Deputy Assistant Secretary
(Environment)

Copy to:
CNI
CNO N45



DEPARTMENT OF THE AIR FORCE
WASHINGTON, DC

AUG 26 2005

Office of the Assistant Secretary

MEMORANDUM FOR DEPUTY ASSISTANT SECRETARY OF THE NAVY
(ENVIRONMENT)

FROM: SAF/IEE
1665 Air Force Pentagon
Washington, DC 20330-1665

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RICHARD A. ASHWORTH, Col, USAF
Acting Deputy Assistant Secretary of the Air Force
(Environment, Safety, and Occupational Health)

cc:
AF/ILEPB



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 36TH WING (PACAF)
UNIT 14007, APO AP 96543-4007

30 August 2006

Mr. Alberto Lamorena
Bureau of Statistics and Plans
Coastal Zone Management Program
PO. Box 2950
Hagatna, Guam 96932

Dear Mr. Lamorena,

In accordance with the Federal Coastal Zone Management Act (CZMA), we request your review and concurrence on our consistency determination for the proposed Establishment and Operation of and Intelligence, Surveillance, Reconnaissance, and Strike capability at Andersen Air Force Base. A completed Guam CZM Assessment Form is attached. The attached CZMA Assessment Form incorporates changes resulting from reviewing and addressing agency and public comments on the Draft Environmental Impact Statement (DEIS).

We have assessed the proposed action and found it to be consistent to the maximum extent practicable with the Guam CZMA program. The action has been purposely sited to reduce any possible project impact spillover to non-federal and coastal lands. If you have any questions, please contact me at (671) 366-2101.

Sincerely,

A handwritten signature in black ink, appearing to read "Jonathan Wald", is written over a horizontal line.

JONATHAN WALD, GS-12
Chief, Natural and Cultural Resources

Attachments
CZM Assessment Form

**GUAM COASTAL MANAGEMENT PROGRAM
ASSESSMENT FORMAT
GUAM COASTAL MANAGEMENT PROGRAM
ASSESSMENT FORMAT**

DATE OF APPLICATION: September 2006
NAME OF APPLICANT: United States Air Force
ADDRESS: 36 CES/CEV Unit 4007, Andersen AFB Guam
TELEPHONE: 671-366-2101 Fax: 671-366-5088
E-Mail Address: jonathan.wald@andersen.af.mil
TITLE OF PROPOSED PROJECT: Establishment and Operation of an Intelligence,
Surveillance, Reconnaissance, and Strike Capability at Andersen AFB, Guam

COMPLETE FOLLOWING PAGES

FOR BUREAU OF STATISTICS AND PLANS ONLY:

DATE APPLICATION RECEIVED: _____
OCRM NOTIFIED: _____ LC. AGENCY NOTIFIED: _____
APPLICANT NOTIFIED: _____ PUBLIC NOTICE GIVEN: _____
OTHER AGENCY REVIEW REQUESTED: _____

DETERMINATION:

☐ CONSISTENT ☐ NON-CONSISTENT ☐ FURTHER INFORMATION REQUESTED

OCRM NOTIFIED: _____ LIC. AGENCY NOTIFIED: _____
APPLICANT NOTIFIED: _____

ACTION LOG:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

DATE REVIEW COMPLETED: _____

GUAM COASTAL MANAGEMENT PROGRAM ASSESSMENT FORMAT

DEVELOPMENT POLICIES (DP):

DP1. Shore Area Development

Intent: To ensure environmental and aesthetic compatibility of shore area land uses.

Policy: Only those uses shall be located within the Seashore Reserve which:

- enhance, are compatible with, or do not generally detract from the surrounding coastal area's aesthetic and environmental quality and beach accessibility; or
- can demonstrate dependence on such a location and the lack of feasible alternative sites.

Discussion:

There would be no direct effect on shore area lands due to establishment and operation of an Intelligence, Surveillance, Reconnaissance, and Strike (ISR/Strike) capability at Andersen AFB. The proposed project would not be located within or immediately adjacent to the Seashore Reserve, nor would it result in any new development in the Shore Area.

DP2. Urban Development

Intent: To cluster high impact uses such that coherent community design, function, infrastructure support and environmental compatibility are assured.

Policy: Commercial, multi-family, industrial and resort-hotel zone uses and uses requiring high levels of support facilities shall be concentrated within appropriate zone as outlined on the Guam Zoning Code.

Discussion:

The proposed establishment and operation of the ISR/Strike within the Main Base at Andersen AFB would be consistent with current land-use plans on Andersen AFB. Construction of facilities and upgrade of infrastructure is consistent with land uses on Andersen AFB. The proposed project does not involve construction of any structure or changes to existing land uses on any non-military property.

DP3. Rural Development

Intent: To provide a development pattern compatible with environmental and infrastructure support suitability and which can permit traditional lifestyle patterns to continue to the extent practicable.

Policy: Rural districts shall be designated in which only low density residential and agricultural uses will be acceptable. Minimum lot size for these uses should be one-half acre until adequate infrastructure including functional sewerage is provided.

Discussion:

The proposed project would take place entirely within the boundaries of Andersen AFB. No rural or agricultural districts will be affected.

DP4. Major Facility Siting

Intent: To include the national interest in analyzing the siting proposals for major utilities, fuel, and transport facilities.

Policy: In evaluating the consistency of proposed major facilities with the goals, policies, and standards of the Comprehensive Development and Coastal Management Plans, Guam shall recognize the national interest in the siting of such facilities, including those associated with electric power production and transmission, petroleum refining and transmission, port and air installations, solid waste disposal, sewage treatment, and major reservoir sites.

Discussion:

The proposed project does not involve construction or siting of major utilities, fuel, or transport facilities. There would be construction of aircraft hangers and other support infrastructure, upgrades of utilities, and roads. All construction activities will be near the flightline and on the Main Base; further, all construction activities will be within the confines of Andersen AFB.

DP 5. Hazardous Areas

Intent: Development in hazardous areas will be governed by the degree of hazard and the land use regulations.

Policy: Identified hazardous lands, including flood plains, erosion-prone areas, air installations' crash and sound zones and major fault lines shall be developed only to the extent that such development does not pose unreasonable risks to the health, safety or welfare of the people of Guam, and complies with the land use regulations.

Discussion:

The boundaries of the areas in which the ISR/Strike facilities would be constructed would be outside of the explosive safety distances surrounding the Andersen AFB munitions storage areas.

Noise associated with Alternative A of the Proposed Action will be generated by aircraft operations and construction activities. Alternative A would increase the noise exposure when compared to the No Action Alternative and the noise contours in the 2001 AICUZ Report. The aircraft operations modeled include the average daily aircraft operations for Alternative A. Approximately 5 percent of the operations would occur during the nighttime (10:00 p.m. to 7:00 a.m.), or no change when comparing Alternative A nighttime operations to the No Action Alternative. Single-event noise level (SEL) from aircraft overflight may be as much as 6 dBA higher than the baseline condition at some points, and may be by as much as 14 dBA lower than the baseline condition at some points. A change of 3 dB is just perceptible while a change of 5 dB is clearly noticeable. Although structural damage can occur with high noise pressure, under Alternative A the highest sound pressure will be less than the level at which structural damage will occur.

Overall, Alternative A noise contours would increase in all directions from the airfield, with the number of off-Base acres (excluding water surface) in the Day-Night Noise Levels (DNL)

65 dBA and greater exposure area increasing by 475 percent. The DNL 70 dBA contour from Alternative A southwest of the Base is nearly the same as the DNL 65 dBA contour from the No Action Alternative (e.g., the baseline). The "tail" of Alternative A DNL 65 dBA extends about 2 miles farther southwest to Dededo, with a "detached" area of exposure beyond. The reason for the additional noise exposure is the increased number of operations by noisier fighter and bomber aircraft when compared to the baseline. The DNL would increase at all points, but the DNL at the analysis points would exceed 65 dBA at only one point (Pati Point). The DNL at Pati Point would be 66 dBA, or 1 dBA greater than the level at which community noise effects are compared. People would be exposed to aircraft noise in three of the four noise zones, with the DNL 65-70 dBA noise zone containing 2,266 of the 2,566 persons exposed to DNL 65-dBA and greater. These 2,566 persons would equate to 6.0 percent of the estimated 42,681 persons who live within the approximate 5-mile radius area associated with airfield airspace environment, and increase of 4.3 percent when compared to the No Action Alternative. This approximate 5-mile radius area includes the airspace allocated to the air traffic control tower and is the area in which closed patterns and maneuvering for takeoffs and landings is accomplished. The overall number of persons who could be highly annoyed by noise exposure would be 610 people, or 552 additional persons when compared to the No Action Alternative.

Interior noise at the schools could be reduced through mitigative measures such as: installation of additional insulation; adding a second window pane; sealing gaps or leaks in windows and doors; replacing windows and doors with windows and doors that offer better attenuation; installing baffles in vents; and improving the exterior roofing.

In June 2002, the American National Standards Institute, Inc. released a new classroom acoustics standard. Compliance with the standard is voluntary; however, school boards and municipalities may reference the standard for new school projects. The goal is to achieve a learning space with low background sound levels and reverberation times in which people will be able to communicate effectively. The new standard establishes an hourly A-weighted average sound level of 40 dB which must not be exceeded for more than 10 percent of the hour. This standard should be considered for new school construction and modernization of existing schools on and in the area around Andersen AFB.

Noise modeling for Alternative B indicated there is no discernable difference in the Alternative B noise contours and noise exposure when compared to Alternative A.

The boundaries of the operations and support facilities for the proposed project are outside of the explosive safety distances surrounding the Andersen AFB munitions storage area. The proposed project would not be developed on any lands containing floodplains, erosion-prone areas, or known major fault lines.

DP 6. Housing

Intent: To promote efficient community design placed where the resources can support it.

Policy: The government shall encourage efficient design of residential areas, restrict such development in areas highly susceptible to natural and man-made hazards, and recognize the limitations of the island's resources to support historical patterns of residential development.

Discussion:

Alternative A housing projects include construction of dormitories and 190 family housing units on Andersen AFB.

DP 7. Transportation

- Intent:** To provide transportation systems while protecting potentially impacted resources.
- Policy:** Guam shall develop an efficient and safe transportation system, while limiting adverse environmental impacts on primary aquifers, beaches, estuaries, coral reefs and other coastal resources.

Discussion:

Short-term traffic congestion from the construction and demolition projects would occur in the construction areas. This congestion would be eliminated when the project activity would be completed, thereby minimizing the potential for long-term impacts.

The number of base entries and exits by vehicles at the Main Gate would increase between 11 and 12 percent. Andersen AFB is the main generator of vehicle traffic along Route 9 west of the Main Gate. When combining the 200 vehicles that would be displaced from the Main Gate to enter the Base at the new Commercial Gate and the 1,100 vehicles that travel Route 9 between the two gates, an estimated 1,300 vehicles would use this portion of Route 9 each day. The 200 vehicles that would enter through the new Commercial Gate would exit the Base through the Main Gate. Thus, only the commercial traffic entering the base would be added to Route 9 traffic between the Main Gate and the new Commercial Gate. It is estimated that the volume of traffic on Route 9 west of the new Commercial Gate would remain at current levels because the short distance between the Commercial Gate and the Main Gate should not change the traffic flows on roads that commercial vehicles use to approach and depart the Base. The left and right turn lanes on Route 9 planned for entry into the Commercial Gate would be sufficiently long enough to handle about 400 vehicles per day during the peak morning and afternoon hours. Typically commercial vehicles would not "peak" as much as automobiles and the location of the Commercial Gate itself would allow sufficient room for any queuing off Route 9.

DP 8. Erosion and Siltation

- Intent:** To control development where erosion and siltation damage is likely to occur.
- Policy:** Development shall be limited in areas of 15% or greater slope by requiring strict compliance with erosion, sedimentation, and land use regulations, as well as other related land use guidelines for such areas.

Discussion:

New facilities and road improvements will not occur in an area 15 percent or greater slope. Either Alternative A or Alternative B will include vegetation clearing and some cut and fill to level any major depressions. Erosion is not expected to occur. Areas bared by vegetation clearing and grading will be revegetated. Best management practices will be used during construction to manage storm water runoff and prevent impact to soil.

RESOURCES POLICIES (RP):

RP1. Air Quality

- Intent:** To control activities to insure good air quality.
- Policy:** All activities and uses shall comply with all local air pollution regulations and all appropriate Federal air quality standards in order to ensure the maintenance of Guam's relatively high air quality.

Discussion:

Construction, alteration and expansion project emissions would be considered short-term emissions. It is estimated the construction, demolition, renovation, and paving activity would last about 12 years and that ground-disturbing activities would occur for about half of the project duration. Construction emissions would produce slightly elevated air pollutant concentrations. However, the effects would be temporary, fall off rapidly with distance from the proposed construction site, and would not result in any long-term impacts. None of the short term emissions associated with Alternative A exceed Prevention of significant deterioration (PSD) levels.

Alternative A would result in elevated emissions from recurring activities (i.e., aircraft, privately owned vehicle, fuel cell maintenance, and corrosion control operations) and which would be above baseline emissions. The greatest emissions for any of the criteria pollutants in weight would be 88.8 tpy for carbon monoxide. Except for the 2-mile radius around three power plants which are non-attainment for sulfur dioxide, the entire Island of Guam is in attainment or unclassified for all criteria pollutants. Andersen AFB is outside of the 2-mile radius for each of the three power plants. Federal actions occurring in air basins that are in attainment of the NAAQS are not subject to the Conformity Rule and a Conformity Determination would not be required.

The discussion of Air Quality under Alternative A applies to Alternative B, and Alternative B would not cause a violation of federal standards.

RP2. Water Quality

Intent: To control activities that may degrade Guam's drinking, recreational, and ecologically sensitive waters.

Policy: Safe drinking water shall be assured and aquatic recreation sites shall be protected through the regulation of uses and discharges that pose a pollution threat to Guam's waters, particularly in estuaries, reef and aquifer areas.

Discussion:

No impact on drinking water is expected from the establishment and operation of the ISR/Strike. Best management practices will be implemented during construction to prevent, and properly respond to accidents, or spills to prevent potential impacts to soils and groundwater. Hazardous waste storage facilities will be built with proper containment structures and operated under appropriate response plans to prevent contamination of soils and groundwater.

Under Alternative A, the increase in population of 3,000 people and an increase in aircraft washing activities will increase water usage, but will not cause a drawdown or depletion of the aquifer. As a result of Alternative A, average daily water consumption would increase by 0.302 mgd from 0.59 mgd to 0.892 mgd when compared to the No Action Alternative. Assuming the most environmentally conservative condition that water distribution system loss would continue at the baseline rate of 1.91 mgd, the water withdrawal from the aquifer for Alternative A would be 2.802 mgd, which equates to 6.52 percent of the total 43 mgd of water withdrawn from the aquifer, an increase of 0.71 percent. The project, due to its location will not have a potential impact to Guam's waters, particularly, reef and aquifer areas.

No new waste water facilities will be constructed for the operation. Under Alternative A, the total wastewater discharge at the WWTP when combining the Base's wastewater and the existing flow would be 9.9 mgd, or about 82 percent of the plant design capacity. The current wastewater facility has sufficient capacity to meet the needs of the increase in people and activities associated with the project.

Under Alternative B, the population would increase by approximately 1,850 personnel. This increase will not cause a drawdown or depletion of the aquifer. Water withdrawal from the aquifer for Alternative B would be 2.687 mgd, which equates to 6.25 percent of the total 43 mgd of water withdrawn from the aquifer, an increase of 0.44 percent above the No Action Alternative.

Under Alternative B, the total wastewater discharge (Base's wastewater and existing flow combined) would be 9.5 mgd, or about 82 percent of the plant design capacity.

RP3. Fragile Areas

Intent: To protect significant cultural areas, and natural marine and terrestrial wildlife and plant habitats.

Policy: Development in the following types of fragile areas including Guam's Marine Protected Areas (MPA) shall be regulated to protect their unique character.

- historical and archeological sites
- wildlife habitats
- pristine marine and terrestrial communities
- limestone forests
- ravine forests
- mangrove stands and other wetlands
- coral reefs

Discussion:

Alternative A and Alternative B would result in construction activities in areas that have not been surveyed for archaeological resources. The construction activities would include new buildings and utility lines to be located in existing open space within the Main Base portion of Andersen AFB. 190 family housing units, the Tactical Missile Maintenance Facility, Conventional Missile Maintenance Facility, Armament Systems Shop (Bldg 51104), Aircraft Staging Area (ASA) facility, new contractor gate, and the expansion of the landfill. Any construction projects within CRMA IV would occur in an area that has not been subject to archaeological survey.

Historical and Archaeological Sites

While Alternative A would not result in any impacts to historic buildings that are listed on the NRHP, construction projects that would occur within the boundaries of historic site 66-07-1064 (North Field). The North Field historic site has been recommended as eligible for listing on the NRHP, and comprises the airfield complex within the Main Operations Area. The Air Force, with the assistance from the State Historic Preservations Office, is undergoing the Section 106 review process to ensure that the cultural resources survey identifies and records significant historical, architectural and archaeological sites in the ISR/Strike area. Construction and training activities will be accomplished in accordance with the Base's ICRMP and agreements from the Section 106 consultation.

Except for the family housing units and family housing management facilities that would not be constructed under Alternative B, the alternative facilities construction and activities are identical to Alternative A.

Ecological condition, wildlife habitat, and forested areas

Andersen AFB has entered into the Endangered Species Act Section 7 consultation with the USFWS. For this project, there are two construction projects that impact forested areas that may support habitat for T&E species. These construction projects are the ASA and Commercial Gate project areas (approximately 144.2 hectares combined, with 73.9 hectares subject to clearance). Other construction projects for the Alternative A will occur in previously disturbed urban areas, and will not affect forested areas. In support of the Section 7 consultation, Andersen AFB has prepared a Biological Assessment (Biological Assessment, Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability at Andersen AFB, Guam, Department of the Air Force, Pacific Air Forces, Hickam Air Force Base, Hawaii. Prepared March 2006). As part of the Biological Assessment (BA), vegetation and wildlife surveys were conducted in January 2006 to assist in the determination of effect on nine federally listed T&E species and one locally rare species. The results of the BA are presented below, and references to surveys indicate the January 2006 surveys performed for the BA, unless otherwise noted.

A vegetation survey of the project footprint determined that no T&E plant species were present in the project areas. Several mature individuals and saplings of the locally rare *Tabernaemontana rotensis* were present within the project footprint. Further, the vegetation survey indicated that the vegetation could be divided into three vegetation communities. The vegetation communities are secondary woody limestone forest community, secondary shrubby limestone community, and herbaceous scrub community. All three vegetation communities contain plant species that may be utilized by three T&E bird species (Mariana crow, Micronesian kingfisher, Guam rail) and one T&E mammal species (Mariana fruit bat). Vegetation communities were further classified into vegetation community types, each of varying quality to wildlife. Approximately 74 hectares of vegetation would be removed in support of construction activities. This amount of removed vegetation is approximately 1.7 percent of the Refuge Overlay and Ritidian Unit of the GNWR. Mariana crows and Mariana fruit bats may use portions of the ASA and Commercial Gate project areas for foraging and nesting (crows). One Mariana fruit bat has been observed foraging in the area, but there have been no recent observations of crows foraging in the area and there are no known nests of the Mariana Crow within the project areas, although suitable trees (*Ficus prolixa*) for nesting occur in less disturbed areas.

Conservation measures are designed to reduce impacts to T&E species resulting from Alternative A of the proposed action, specifically the Mariana crow (*Corvus kubaryi*), Mariana fruit bat (*Pteropus mariannus mariannus*), Guam rail (*Rallus owstoni*), and the Micronesian kingfisher (*Halcyon cinnamomina cinnamomina*). Conservation measures as part of Alternative A include the following:

- Adjustment of the construction footprint from the initial proposed design to reduce clearance within areas of relatively intact secondary forest.
- A Wildlife Management Specialist, whose duties would include: conduct and manage depredation hunts within ungulate exclosure areas; recording information about ungulate kills; trapping of exotic predators; fence line reconnaissance for maintenance; and coordination with resource agencies.
- Ungulate Exclosure fencing of two units totaling approximately 200 hectares would create exclosures to prevent incursion of deer and pigs. Deer and pigs would be removed from within the exclosures, and the vegetation allowed to grow without browse pressure. The exclosures would require construction of 3,400 meters of fence line, but only 310 meters of fence line will require vegetation removal. The remaining fence line will be constructed along roads and through herbaceous areas, requiring little or no vegetation clearing.

- *Ungulate Management and Control Programs, including development of an Ungulate Control Plan; facilitation of research, and the public hunting program.*
- *Outplanting of Tabernaemontana rotensis seedlings and saplings outside the project area to offset the loss of Tabernaemontana rotensis individuals during construction activities.*
- *Outplanting of foraging trees important to Mariana Crow and Mariana Fruit Bat. This conservation measure would contribute to existing foraging habitat with native trees important to these species.*
- *Vegetation Surveys relevant to recovery of Mariana crow and Mariana fruit bat; including quantification of the vegetation community types that cover Andersen AFB, particularly areas important to the Mariana crow, the Mariana fruit bat, and the Micronesian kingfisher. This conservation measure can aid in the proper allocation of resources for species management.*
- *Noise Study: Aircraft noise has the potential for effects to the Mariana fruit bat and the Mariana crow. The noise study will focus on Mariana fruit bats near the main colony at Pati Point to determine the degree of habituation to aircraft overflight. Supplemental to field measurements of noise, surveys of reproductive success, and predator pressures will be concurrent with noise studies. Development of a scope of work and survey methods will be a cooperative effort with USFWS and DAWR.*
- *Environmental Education and Awareness Information, including information concerning conservation issues at Andersen AFB would be available to participants of training programs.*
- *Brown Tree Snake trapping at Pati Point: Predation by BTS on fruit bat pups is believed to be the primary factor for the absence of young individuals. This conservation measure proposes to trap BTS at the Pati Point colony, thereby reducing the threat posed to Mariana fruit bat pups by BTS predation. Existing traps will be deployed and maintained by the proposed Wildlife Management Specialist. Cooperation with relevant resource agencies will be sought to strategically place traps to maximize BTS trapping numbers.*
- *Brown Tree Snake Interdiction and Control, Plan ensures that 100 percent inspection of out-bound craft (air and water) from Andersen AFB is inspected*
- *Adaptive management is a process that allows for development and implementation of natural resource management strategies in response to a degree of biological uncertainty. This conservation measure proposes to use data from the proposed noise studies (described above) to modify aircraft ground track location and flight profile (i.e., airspeed and/or altitude) using an adaptive management strategy provided the change would not constitute a flight hazard or noncompliance with the aircraft flight manual. Habituation of Mariana fruit bats to noise is expected; however, the degree of habituation represents a data gap in the current literature. As aircraft overflights increase, management recommendations will be submitted to modify existing flight tracks and profiles.*
- *In consultation with USFWS, the Air Force has agreed to a number of avoidance and minimization measures that would further reduce impacts to wildlife resources. These measures include surveys for Mariana crows and Mariana fruit bats within affected areas prior to construction, limiting construction to outside of crow breeding and nesting seasons (April through October) in crow areas,*

and implementing conservation measures outside of crow nesting seasons. Further, the Air Force will use hooded street lighting for lighting of the roadway between the Commercial Entry Gate and the Truck Inspection facility, as well as around the ASA.

Noise associated with Alternative A may include construction noise and aircraft overflight noise due to project operations. Noise effects are particularly addressed for the one bat species and three bird species of highest concern. Maximum noise levels at Pati Point would not exceed those of the current conditions; however, the frequency of aircraft overflights will increase to an estimated three times per hour, based on additional flight tracks and aircraft operations.

Under current conditions, it has been suggested that bats at the Pati Point colony have become relatively habituated to daytime aircraft noise and continue to roost there. It is unknown if bats would become habituated to more frequent noise under Alternative A. Habituation of bats to increased overflight noise is expected (Janeke 2005), especially since aircraft overflights will be incrementally increased over a multi-year period. The degree of habituation, however, is not represented in the current literature. Conservation measures involve an Adaptive Management strategy, which is commonly used when data gaps exist, to continually address noise effects as overflights increase. Conservation measures also allow for modification of overflight patterns to reduce effects of increased aircraft. Noise events associated with aircraft overflights may affect the Mariana fruit bat; however, adverse effects are offset by conservation measures. These conservation measures include the protection and management of 200 hectares of suitable habitat near Ritidian Point, BTS trapping at the Pati Point colony, and an adaptive management strategy that uses scientific research to affect operational changes to overflight routes.

Mariana Crows are sensitive to human disturbances, and may be particularly sensitive to noise generated from aircraft. However, there is some indication that Mariana crows can be tolerant of disturbances, much like related species of crows throughout the world. One study has observed some pairs renesting after nest disturbances, indicating their tenacity. This tolerance can lead to habituation of disturbances that are not threatening to the individuals. Noise from aircraft overflights are expected to affect Mariana crow behavior. Conservation measures will reduce these effects by applying an adaptive management strategy to modify ground tracks based on monitoring studies. Further, conservation measures will designate approximately 200 hectares of forested land, some of which is currently utilized by the Mariana crow, as a conservation land use category. Management actions for these 200 hectares include ungulate enclosure fencing, ungulate depredation hunts, and forage plot establishment.

Micronesian kingfisher exists only as captive populations. If kingfishers are released to wild habitats in the future, the likely location of release is the munitions storage area. The DNL 65 dBA noise contour from aircraft operations would extend into the southernmost portion of the MSA area, and maximum sound pressures from aircraft overflight in the southern MSA is 97 dBA. It is not known if these noise levels will affect the kingfisher.

Gaum Rail exists only as captive populations. If re-release of rails is attempted in the future, the areas targeted for release will not be subject to noise increases sufficient to adversely affect the recovery efforts of the Guam rail.

Other T&E species will not be affected by construction noise or aircraft overflight noise.

Except for the family housing units and family housing management facilities that would not be constructed under Alternative B, the alternative facilities construction and activities are identical to Alternative A. Therefore, the discussion and analysis for Alternative A apply to Alternative B.

Based on the above descriptions, the effects determination is based on the assumption that actions would take place to promote the recovery of listed species and that the species population would expand based on successful actions.

Species	Potential Effects of Construction	Potential Effects of Operations
<i>Heritiera longipetiolata</i>	No effect	No effect
<i>Serianthes nelsonii</i>	No effect	No effect
<i>Tabernaemontana rotensis</i>	May affect	May affect
Mariana fruit bat	May affect / adversely affect	May affect
Mariana crow	May affect	May affect
Micronesian kingfisher	May affect	May affect
Guam rail	May affect	May affect
Mariana Islands tree snail	May affect	No effect
Pacific tree snail	May affect	No effect
Mariana Islands fragile tree snail	May affect	No effect
Mariana eight-spot butterfly	May affect	No effect

With the exception of the Mariana fruit bat, the proposed action may affect - but not adversely affect, populations of existing species as well as species recovery of species populations. Although the project footprint has been altered to limit impacts to intact secondary limestone forest (See Subsection 2.2.1.2), the clearing of vegetation will impact one known Mariana fruit bat foraging area. This clearing of habitat will represent an adverse effect, however, the clearing will not jeopardize the continued existence of the species, nor will the clearance adversely modify the overall habitat. The effects determination for the proposed action is based on the following assumptions:

- Existing conditions for listed species within habitat areas of the overlay refuge continue to degrade. Excessive ungulate pressure prevents recruitment of emergent canopy species within forested areas, while BTS predation limits recovery of listed species.
- The size of the areas subject to clearance is relatively small in comparison to available habitat. Vegetation clearance will remove less than 74 hectares, which represents approximately 1.6 percent of the combined area of the GNWR Ritidian Unit and refuge overlay units. This small amount of clearance will not adversely affect listed species.
- Noise from aircraft overflights will affect Mariana fruit bat and Mariana crow recovery efforts, as well as current populations. Based on current literature and field observations, habituation to an incremental increase of overflights is expected. Further, adverse effects that do become apparent due to aircraft operations will initiate modifications to aircraft ground tracks and profiles over sensitive areas, through an adaptive management strategy. This adaptive management strategy involves a multi-year monitoring program of noise effects using up to date standards for acoustical studies on sensitive species that will affect operational changes.
- Implementation of the conservation measures will reverse the continued degradation of approximately 200 hectares (ungulate exclosures and management near Ritidian Point) of important habitat, and therefore, contribute to the recovery of listed species. In addition, conservation measures address issues associated with exotic predator interdiction and control. Many of the conservation measures correspond directly to management needs identified as critical recovery actions in USFWS recovery plans for listed species. Further, the conservation measures will effectively manage areas of

higher quality habitat for listed species. Therefore, the species will utilize the better quality habitat that will be effectively enhanced by the conservation measures, rather than the relatively lower quality habitat currently present at Andersen main.

The construction and aircraft operations for Alternative B will be similar to Alternative A, with fewer aircraft flights and fewer personnel. The analysis presented above would also apply to Alternative B.

Under Alternative A and Alternative B of the proposed action there would be no activity either for construction or aircraft operations that will require a change in the provisions of the current INRMP. The proposed action is consistent with the military mission and management of natural resources on Andersen AFB.

There would be no impact to native primary growth limestone forest, ravine habitats, coral reefs, mangrove stands, or other wetlands.

The BTS interdiction policy will ensure 100 percent inspection of all outbound cargo (air and ship) from Andersen AFB for BTS, to prevent offsite transport of BTS to other areas.

RP4. Living Marine Resources

Intent: To protect marine resources in Guam's waters.

Policy: All living resources within the waters of Guam, particularly fish, shall be protected from over harvesting and, in the case of corals, sea turtles and marine mammals, from any taking whatsoever.

Discussion:

The project would be implemented entirely within the operational areas of Andersen AFB. No action would take place that would affect the living resources within the waters of Guam.

RP5. Visual Quality

Intent: To protect the quality of Guam's natural scenic beauty

Policy: Preservation and enhancement of, and respect for the island's scenic resources shall be encouraged through increased enforcement of and compliance with sign, litter, zoning, subdivision, building and related land-use laws. Visually objectionable uses shall be located to the maximum extent practicable so as not to degrade significant views from scenic overlooks, highways and trails.

Discussion:

Both Alternative A and Alternative B will require some clearing of vegetation and shrub understory for facility construction. Much of this will be in previously disturbed areas. All construction will occur within the confines of Andersen AFB, and would have very little impact on visual quality.

RP6. Recreation Areas

Intent: To encourage environmentally compatible recreational development.

Policy: The Government of Guam shall encourage development of varied types of recreational facilities located and maintained so as to be compatible with the surrounding environment and land uses, adequately serve community centers and urban areas and protect beaches and such passive recreational areas as wildlife, marine conservation and marine protected areas, scenic overlooks, parks, and historical sites.

Developments, activities and uses shall comply with the Guam Recreational Water Use Management Plan (RWUMP).

Discussion:

Bow hunting for pigs and deer is currently allowed in the area proposed for the ASA facility, and the annual average harvest in this area is quite low. It is expected that once this facility is operational, recreational hunting would no longer be allowed due to safety and security considerations. Approximately 144 hectares of a total 855 hectares at Andersen Main will be removed from hunting. Recreational hunting will continue at the same level in the existing hunting units that would not be closed.

RP7. Public Access

Intent: To ensure the right of public access.

Policy: The public's right of unrestricted access shall be ensured to all non-federally owned beach areas and all Guam recreation areas, parks, scenic overlooks, designated conservation areas and their public lands. Agreements shall be encouraged with the owners of private and federal property for the provision of releasable access to and use of resources of public nature located on such land.

Discussion:

The proposed project occurs on a restricted-access federal military installation. No non-federally owned beach areas, territorial recreation areas, parks, scenic overlooks, designated conservation areas or their public lands would be affected. Public access to some hunting units would be curtailed for security reasons.

RP8. Agricultural Lands

Intent: To stop urban types of development on agricultural land.

Policy: Critical agricultural land shall be preserved and maintained for agricultural use.

Discussion:

The proposed project does not involve development outside of the confines of Andersen AFB. Therefore, urban development of agricultural lands would not occur.

**FEDERAL CONSISTENCY
SUPPLEMENTAL INFORMATION FORM**

Date: _____

**Project/Activity Title or
Description:** _____

Location: _____

Other applicable area(s) affected, if appropriate:

Est. Start Date: _____ **Est. Duration:** _____

APPLICANT

Name & Title _____

Agency/Organization _____

Address _____

Zip Code _____

Telephone No. during business hours:

A/C (____) _____

A/C (____) _____

Fax (____) _____

E-mail Address: _____

AGENT

Name & Title _____

Agency/Organization _____

Address _____

Zip Code _____

Telephone No. during business hours:

A/C (____) _____

A/C (____) _____

Fax (____) _____

E-mail Address: _____

CATEGORY OF APPLICATION (check one only)

☐ I Federal Agency Activity

☐ II Permit or License

☐ III Grants & Assistance

TYPE OF STATEMENT (check one only)

☐ Consistency

☐ General Consistency (Category I only)

☐ Negative Determination (Category I only)

☐ Non-Consistency (Category I only)

APPROVING FEDERAL AGENCY (Categories II & III only)

Agency _____

Contact Person _____

Telephone No. during business hours:

A/C (____) _____

A/C (____) _____

Fax (____) _____

FEDERAL AUTHORITY FOR ACTIVITY

Title of Law _____

Section _____

OTHER GUAM APPROVALS REQUIRED

Date of _____

[illegible]

BUREAU OF STATISTICS AND PLANS
(Bureau of Planning)
Government of Guam

Felix Perez Camacho
Governor of Guam

Kaleo Scott Moylan
Lieutenant Governor

P.O. Box 2950 Hagåtña, Guam 96932
Tel: (671) 472-4201/3
Fax: (671) 477-1812

Alberto "Tony" A. Lamorena V
Acting Director

SEP 22 2006

Mr. Jonathan Wald, GS-12
Chief, Natural and Cultural Resources
Department of the Air Force
Headquarters, 36th Wing (PACAF)
Unit 14007, APO AP 96943-4007

Dear Mr. Wald:

The Bureau of Statistics and Plans has completed the review of the Federal Consistency determination which we have received on September 1, 2006 for the Establishment and Operation of an **Intelligence, Surveillance, Reconnaissance, (ISR) and Strike Capability** at Andersen Air Force Base, Guam.

We have coordinated our review of the GCMP Assessment Format with the Government of Guam's development and resource agencies, including the Department of Parks and Recreation (DPR), Guam Environmental Protection Agency (GEPA), Department of Agriculture (DoAg), and Department of Land Management (DLM). These Government agencies have no objections to the proposed establishment and operation of the ISR/Strike capability at the AAFB. However, the Bureau was informed by the DoAg's Division of Aquatic and Wildlife Resources that they still have several issues and concerns that need to be addressed:

1. The clearing of 73.9 hectares of native forest critical to endangered species habitat.
2. The location of proposed 190 family housing units need to be more clearly delineated.
3. Identification of funding base as well as support staff to implement the duties of the Wildlife Manager Specialist.
4. Inclusion of assurances that reintroduction of endangered species to native habitat will not be impeded by the proposed project.
5. The need for the Air Force to ensure that funding for the installation of the snake barrier is made a part of this action.
6. Consider also on the "Noise Impact Study" the potential impact of bats abandoning the Pati Point colony site, and the development of appropriate measure, including offsite mitigation, to offset the impact, if it occurs.
7. Although, DAWR supports the efforts to conduct the Brown Tree Snake trapping and Interdiction and Control, at Pati Point, they feel that it should be coordinated so that not only traps are used, but also the best available techniques and methods are incorporated to minimize impacts to the fruit bats. ITS control (using traps and other methods) should not be done by the Wildlife Management Specialist. It should be contracted to USDA or another qualified agency. Additionally, research scope and direction of NARC efforts should be determined by DOD, Wildlife Services Operations, NWRC, DAWR, and USFWS through annual and multi-year goals with discrete, finite goals.

ISR/Strike AAFB

Page 2

8. Feral cats are detrimental to the recovery of the flightless Guam rail. There's a need to regulate/document the location of family pets, by registering with the Air Force Veterinarian upon arrival at AAFB and also when the owner's leaves/relocate. They should be made responsible in reporting to the veterinarian any transfer of ownership to new owner or death of the pet.
9. DP5. Hazardous Areas states that "Interior noise at the schools could be reduced through mitigative measures." Would Andersen fund the insulation of the schools in the impacted area?
10. Need to ensure that all the mitigation actions are COMPLETELY funded.

The document has indicated that the survey of archaeological resources has not been done, which is the DPR's Historic Preservation Office concern. Section 106 consultation and development of a Memorandum of Agreement is needed for this project. GEPA also has some environmental issues that need to be addressed, such as the water run-off, particularly with regard to impacts on the Guam Aquifer Recharge Area/Northern Water Lens and erosion controls measures planned to curtail proposed construction impacts on Guam's water resources which must be described in detail in the Final EIS. The Federal Consistency determination indicates that the proposed construction activities, including new buildings and utility lines and other related structures will all be within the confines of AAFB, outside of the explosive safety distances surrounding the AAB munitions storage areas. We do appreciate that the Department of the Air Force do recognized that Federal consistency requirement applies when any federal agency activities, including development projects, regardless of location, affects any land or water use or natural resource of the coastal zone, 15 CFR Part 930, Subpart C.

Based on our review of the submitted document and the Department of the Air Force willingness to work closely, in coordinated effort with the Government of Guam, the Bureau concurs that this federal action will be undertaken in a manner consistent with the objectives and enforceable policies of the Guam Coastal Management Program (GCMP), to the maximum extent practicable, in accordance with the Coastal Zone Management Act of 1972 (PL. 92-583) as amended (P.L. 94-370, PL. 104-150, the Coastal Zone Protection Act of 1996). However, please note that this GCMP concurrence does not preclude the need to obtain other Government of Guam and Federal approvals. We will appreciate receiving a copy of the Final EA when it's ready.

Sincerely,



ALBERTO A. LAMORENA V
Acting Director

cc: GEPA
DoAg
DPR
DLM
Bill Millhouser
John Parks



DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES

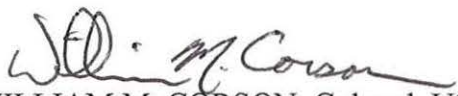


MEMORANDUM FOR COMPACFLT (Attn: N01CE, Mr. Larry Foster)

FROM: HQ PACAF/A7N
25 E Street, Suite D-306
Hickam AFB, HI 96853-5412

SUBJECT: Air Force Cooperating Agency Offer of Assistance for Military Training in the Marianas Environmental Impact Statement

1. The Air Force requests to participate as a formal cooperating agency in preparation of an update to the environmental impact statement (EIS) for the Military Training in the Marianas as prescribed in the President's Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, 40 CFR §1501.6, Cooperating Agencies. For training purposes, the Air Force has interest in the airspace that overlays Farallon de Medinilla (FDM), which will be assessed in the subject EIS.
2. As a cooperating agency, the Air Force understands it will be expected to participate in various portions of the EIS development. As a cooperating agency, the Air Force asks to:
 - Participate in the scoping process;
 - Assume responsibility, upon request by your organization, for developing information and preparing analyses on issues for which it has special expertise; and
 - Make Air Force staff available for interdisciplinary reviews.
3. The Air Force asks that it be provided appropriate, related information in a timely fashion to ensure unnecessary delays are avoided. In turn, the Air Force commits to respond in a prompt manner. Should you or your staff have further questions regarding this memo, our point of contact is Lt Col Christopher Sharp at (808) 448-0470, christopher.sharp@hickam.af.mil.


WILLIAM M. CORSON, Colonel, USAF
Director, Installations and Mission Support

cc:
HQ USAF/A7CPB
HQ PACAF/A7N

APPENDIX B PUBLIC INVOLVEMENT

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Public Involvement

The *Air Force Environmental Impact Analysis Process* (32 CFR 989) sets forth the public involvement process for the environmental impact analysis process (EIAP). Public involvement is accomplished to allow citizens and interested parties the opportunity to participate in the EIAP. Examples of public involvement include;

- Publishing a notice of intent (NOI) to prepare an environmental impact statement (EIS) in the *Federal Register*.
- Publishing notices of the public scoping meeting in a local newspaper.
- Conducting a public scoping meeting to inform the public of a proposed action.
- The opportunity for the public to comment on the proposal in conjunction with the NOI and scoping meeting.
- Publishing a notice of the availability (NOA) of a draft EIS or a draft environmental assessment (EA) in the *Federal Register* and a local newspaper for an EIS and/or an EA that announces the availability of the document for public comment.
- Placing a copy of the draft EIS in libraries and other facilities for public review.
- Posting the file for the draft EIS on an internet web that is identified in the NOA.
- Conducting a public hearing concurrent with the comment period associated with availability of the draft EIS or draft EA.
- Publishing a NOA for the final EIS in the *Federal Register*.

The Air Force published a NOI and conducted a public scoping meeting to inform the public of the proposed ISR/Strike action. The NOI was published in the *Federal Register* on May 18, 2005. Newspaper ads announcing the public scoping meeting that was conducted June 9, 2005 were published in the *Pacific Daily News* on May 21 and June 5, 6, and 8, 2005. The scoping meeting was held at a University of Guam lecture hall, began at 6:00 p.m., and was completed about 8:00 p.m.

The comments received in response to the NOI; comments received at the scoping meeting; and comments received during the period following the scoping meeting are contained in this appendix. Personal information such as addresses, email addressed, and telephone numbers were deleted as appropriate for privacy purposes.

The notice of availability of the draft EIS for review was published in the *Federal Register* on May 12, 2006. Newspaper ads announcing the availability of the draft EIS and the public hearing were published in the *Pacific Daily News* on May 12, 14, and 30, 2006. The public hearing was held on June 1, 2006 at the Hilton Guam, began at 6:00 p.m., and was completed about 7:30 p.m. A summary of the meeting is contained in this appendix. Oral and written comments received at the public hearing and other comments received during the comment period are contained in this appendix.

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**PUBLIC INVOLVEMENT
SCOPING**

Pacific Daily News
GUAM'S *complete* SOURCE

238 Archbishop Flores Street
Hagatna, Guam 96910

DATE June 15, 2005

CERTIFICATE OF PUBLICATION

TO WHOM IT MAY CONCERN:

The undersigned hereby certifies that the below DESCRIBED legal Notice, Proof of Publication of which is herewith enclosed and attached thereto, was published in the **PACIFIC DAILY NEWS/SUNDAY NEWS** on the following days:

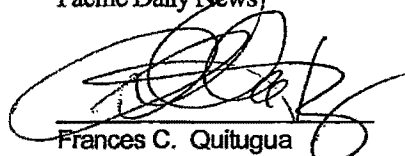
May 21, June 5, 6 & 8, 2005

Subject Matter Published: *Public Scoping Meeting*

Business Location: *8000 Centre Park Drive, Suite 200
Austin, TX 78754*

Name of Applicant: **Sherrie G. Keenan**

Pacific Daily News



Frances C. Quitugua
National Account Executive

PROOF OF PUBLICATION

Tearsheet attached

GUAM PUBLICATIONS INCORPORATED

From the desk of...

Fran Quitugua, Major Accts/Nat'l Sales Tel.: (671) 477-9711 ext. 261 Fax: (671) 477-0359
E-mail: fquitugua@guampdn.com



**PUBLIC SCOPING MEETING
PROPOSED GLOBAL
STRIKE TASK FORCE
AT ANDERSEN AIR
FORCE BASE, GUAM**



To support the Nation's military units in the Pacific Command and worldwide, the Air Force is proposing to base a Global Strike Task Force (GSTF) at Andersen Air Force Base (AFB), Guam. The proposed action would base three Global Hawk unmanned aerial intelligence, surveillance, and reconnaissance aircraft and 12 aerial refueling aircraft at Andersen AFB. Additionally, 48 fighter and six bomber aircraft would rotate to Andersen AFB from bases in the 50 states. The GSTF would provide the western Pacific region with improved intelligence, surveillance, and reconnaissance, strike, and aerial refueling capability. Approximately 2,400 additional military, civilian, and contractor personnel would be required to support the proposed action. The GSTF also would result in facility construction, addition, and alteration projects to support basing and operation.

A Notice of Intent for this project was published in the Federal Register on May 18, 2005; this notice can be viewed at <http://www.epa.gov/fedrgstr/EPA-IMPACT/2005/May/Day-18/9902.htm>. The Air Force is in the process of preparing a Draft Programmatic Environmental Impact Statement (DPEIS) in accordance with the National Environmental Policy Act of 1969, Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] Sections 1500-1508), and the Air Force's Environmental Impact Analysis Process (32 CFR Section 989). The DPEIS will identify, describe, and evaluate the potential environmental impacts that may result from implementation of the Proposed Action, a Rotational Aircraft Alternative, or No Action Alternative, and possible cumulative impacts from other past, present, and reasonably foreseeable future actions planned for the Base.

The public is invited to attend a public scoping meeting to obtain information, and provide input on any environmental concerns.

**Thursday, June 9, 2005 from
6:00 p.m. to 8:00 p.m.**

**University of Guam, College of Arts and Sciences
(Building B Lecture Hall)**

If you wish to submit written comments, or need more information, please contact:

**Mr. Scott Whittaker
Environmental Flight Chief
Unit 14007
APO, AP 96543-4007
Phone: (671) 366-2101**

For consideration in the DPEIS, written comment letters must be received by June 30, 2005.

33 Pacific Daily News, Saturday, May 21, 2005 guampdn.com

27 PACIFIC SUNDAY NEWS, June 5, 2005 guampdn.com

27 Pacific Daily News, Monday, June 6, 2005 guampdn.com

37 Pacific Daily News, Wednesday, June 8, 2005 guampdn.com

Annual Responses: 53,456.

Hours Per Response: .5.

Total Burden Hours: 26,728.

Obtaining Copies of Proposals:

Requesters may obtain a copy of the information collection documents from the General Services Administration, FAR Secretariat (VIR), Room 4035, 1800 F Street, NW, Washington, DC 20405, telephone (202) 501-4755. Please cite OMB Control No. 9000-0074, Contracting Funding—Limitation of Costs/Funds, in all correspondence.

Dated: April 29, 2005

Julia B. Wise,

Director, Contract Policy Division.

[FR Doc. 05-9850 Filed 5-17-05; 8:45 am]

BILLING CODE 6820-EP-S

DEPARTMENT OF DEFENSE

Department of the Air Force

Notice of Intent To Prepare a Draft Programmatic Environmental Impact Statement for Basing a Global Strike Task Force, Andersen Air Force Base, Guam (U.S. Territory)

AGENCY: United States Air Force.

ACTION: Notice of intent to prepare a Draft Programmatic Environmental Impact Statement for basing a Global Strike Task Force, Andersen Air Force Base, Guam (U.S. territory).

SUMMARY: Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321, *et seq.*), the Council on Environmental Quality Regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations (CFR) parts 1500-1508), and Air Force's Environmental Impact Analysis Process as implemented by 32 CFR part 989, the United States Air Force (Air Force) is issuing this notice to advise the public of our intent to prepare a Draft Programmatic Environmental Impact Statement (DPEIS) for the proposed basing of the Global Strike Task Force (GSTF) at Andersen Air Force Base (AFB), Guam. The DPEIS will analyze and evaluate the impacts of alternatives

for the proposed establishment of an intelligence, surveillance, and reconnaissance, strike, and aerial refueling capability at Andersen AFB, as part of Pacific Command's GSTF initiative. The proposed action would base three Global Hawk unmanned aerial intelligence, surveillance, and reconnaissance aircraft and 12 aerial refueling aircraft at Andersen AFB. Additionally, 48 fighter and 6 bomber aircraft would rotate to Andersen AFB from bases in the 50 states. Approximately 2,400 additional military, civilian and contractor personnel would be required to support the proposed action. The action would also result in facility construction, addition, and alteration projects to support basing and operation.

This notice is being provided to obtain suggestions and information from other agencies and the public on the scope of issues to be addressed in the DPEIS, to include alternatives to the proposed action and the potential for impacts. Public comments on the scope of the DPEIS, reasonable alternatives that should be considered, anticipated environmental concerns, and actions that might be taken to address these issues are requested. A public scoping meeting will be held to obtain agency and community input to ensure that all relevant concerns are identified and addressed in the DPEIS. Notification of the meeting location and time will be made in the local area and will be announced via local news media. Written comments will also be accepted at the address listed below.

FOR FURTHER INFORMATION CONTACT: All comments received at the meeting, and all written comments received by June 30, 2005 will be considered in preparing the DPEIS. Please submit written comments to Mr. Scott Whittaker, Environmental Flight Chief, Unit 14007, APO AP 96543-4007. For further information, please call (671) 366-2101.

Albert F. Bodnar,

Federal Register Liaison Officer.

[FR Doc. 05-9902 Filed 5-17-05; 8:45 am]

BILLING CODE 5001-05-P

DEPARTMENT OF ENERGY

[FE Docket No. 05-11-NG, 05-15-NG, 05-12-LNG, 05-14-NG, 05-13-LNG, 05-16-NG, 05-17-NG, 05-18-NG, 04-19-NG, 05-19-NG, 05-20-NG, 05-21-NG, 05-23-NG, 05-26-NG, and 05-22-NG]

Office of Fossil Energy; Cargill, Incorporated, Progas U.S.A. Inc., Statoil Natural Gas LLC, Bay State Gas Company, Distrigas LLC, H.Q. Energy Services (U.S.) Inc., Avista Energy, Inc., Sempra Energy Trading Corp., Coral Canada U.S. Inc., Eagle Energy Partners I, L.P., Cinergy Marketing 7 Trading, L.P., BP West Coast Products LLC, Mexicana de Cobre, S.A. de C.V., Goldendale Energy Center, LLC, Dartmouth Power Associates Limited Partnership; Orders Granting and Vacating Authority to Import and Export Natural Gas, Including Liquefied Natural Gas

AGENCY: Office of Fossil Energy, DOE.

ACTION: Notice of orders.

SUMMARY: The Office of Fossil Energy (FE) of the Department of Energy gives notice that during March and April 2005, it issued Orders granting and vacating authority to import and export natural gas, including liquefied natural gas. These Orders are summarized in the attached appendix and may be found on the FE Web site at <http://www.fe.doe.gov> (select gas regulation). They are also available for inspection and copying in the Office of Natural Gas Regulatory Activities, Docket Room 3E-033, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586-9478. The Docket Room is open between the hours of 8 a.m. and 4:30 p.m., Monday through Friday, except Federal holidays.

Issued in Washington, DC, on May 10, 2005.

R.F. Corbin,

Manager, Natural Gas Regulation, Office of Natural Gas Regulatory Activities, Office of Fossil Energy.

Appendix—Orders Granting Import/Export Authorizations

Order No.	Date issued	Importer/exporter FE docket No.	Import volume	Export volume	Comments
2075	3-9-05	Cargill, Incorporated, 05-11-NG.	2,000 Bcf		Import and export a combined total of natural gas from and to Canada and Mexico, beginning on April 15, 2005, and extending through April 14, 2007.
2076	3-15-05	ProGas U.S.A. Inc., 05-15-NG.	800 Bcf ..	200 Bcf ..	Import and export natural gas from and to Canada, beginning on April 1, 2005, and extending through March 31, 2007.
2077	3-15-05	Statoil Natural Gas LLC, 05-12-LNG.	200 Bcf	Import LNG from various international sources, beginning on June 1, 2006, and extending through May 31, 2007.

PACIFIC AIR FORCES

SCOPING MEETING

PROGRAMMATIC EIS

GLOBAL STRIKE TASK FORCE

ANDERSEN AFB, GUAM

JUNE 9, 2005

1 LT COL DAVID KENDRICK: Hafa Adai and Good
2 Evening! My name is Lt Col David Kendrick from the Judge
3 Advocate General's Office of Headquarters Pacific Air Forces
4 in Hawaii. I would like to welcome you to tonight's scoping
5 meeting.

6 For the official record, this is a public
7 scoping meeting for the Programmatic Environmental Impact
8 Statement (EIS) of the proposed basing of a Global Strike
9 Task Force at Andersen Air Force Base, Guam. This meeting is
10 now called to order.

11 The time is now 6:12 p.m., Thursday, June 9,
12 2005. We're in the Lecture Hall B, located at the University
13 of Guam, Mangilao, Guam.

14 Notice of this meeting was published in the
15 Pacific Daily News on May 21, June 5, 6, and 8, 2005. Also
16 for the record, this meeting is being transcribed by a court
17 reporter so that a word-for-word record of this meeting will
18 become part of the administrative record for this project. A
19 summary of the transcript will be available at the Andersen
20 Air Force Base Public Affairs Office and the Nieves Flores
21 Public Library in Hagatna.

22 Thank you for taking time to come here tonight.
23 I will be your meeting moderator.

24 Before we begin, a few administrative remarks:

25 Rest rooms are located in the hallway out the

1 door to your left or right.

2 A water fountain is also located in the hallway
3 outside this room and please feel free to get up any time
4 during the meeting to use the restroom.

5 So that everyone can hear what is being said,
6 please refrain from talking among yourselves when someone
7 else is speaking. We would like to ask that the sound
8 function of all cell phones be turned off until the
9 conclusion of this meeting.

10 If you haven't already done so, before the
11 conclusion of this meeting, please sign one of the meeting
12 sign-in sheets and please write clearly.

13 And finally, in the unlikely event of an
14 emergency, there is a door there to my left. If exit is
15 necessary, please do so in an orderly manner.

16 Our scoping meeting tonight will be organized in
17 the following way:

18 After my brief remarks, I will introduce members
19 of the project team. Project team members from Andersen Air
20 Force Base and Pacific Air Forces will provide an overview of
21 the project and planning activities now ongoing. Following
22 this, I will again then provide instructions for those of you
23 who wish to make written or verbal statements about this
24 proposed project.

25 Just briefly before we go on, those of you who

1 only want to make a written statement can go to the back of
2 the room where comment forms and pens have been placed on the
3 tables.

4 If you want to write your comment while you are
5 at your seat and need a pen or a form, just raise your hand,
6 we'll get a comment sheet like this to you. Please leave
7 your written comment sheet with one of the staff, or send
8 comments to the Environmental Flight. The mailing address is
9 on the handout. To be considered in the draft EIS, written
10 comments must be received no later than the 30th of June
11 2005.

12 If you would like to make a verbal comment,
13 please fill out a green speaker request card and give it to
14 one of our staff or hold it up and we will get it from you.
15 If you raise your hand now, one of the project team members
16 will bring one to you.

17 The purpose of this meeting in the environmental
18 process is: To provide the community an opportunity to hear
19 about the proposed project or action, and it is an
20 opportunity for you as members of that community to comment
21 about the potential environmental impact of the proposed
22 action.

23 Tonight's meeting is one of the first steps in
24 the environmental review process. A typical environmental
25 impact statement, or an EIS, evaluates cultural resources,

1 socioeconomics, and many other environmental issues.

2 A Programmatic Type EIS analyzes a proposed
3 broad policy action, in our case the Global Strike Task Force
4 Basing, which may effect the environment at a specific
5 location. The Programmatic EIS was chosen by the Air Force
6 because specific Global Strike Task Force Basing details like
7 the final number of aircraft and types, personnel strength,
8 and construction schedules have not been fully defined at
9 this time.

10 However, there are concerns specific to each
11 project and each community. That is why we encourage you as
12 members of the local community to identify your concerns
13 specific to this community and this project. Your input and
14 comments help to shape the scope of this project's
15 environmental review.

16 I do want to clarify one thing: It is very
17 early in the planning process for the Global Strike Task
18 Force Action, and studies are still being conducted. Because
19 we are still early in the planning process and may not have
20 definite answers to your questions at this time, we are
21 unable to provide responses at tonight's meeting. Your
22 concerns will be addressed in the draft EIS now in
23 preparation.

24 For this reason, with the exception of
25 administrative information, responses to the audience will

1 not be made this evening.

2 Several members of our program team are here
3 tonight and I would like to have you meet them. Please stand
4 when I mention your name.

5 Tonight's speakers are: Colonel Steve Wolborsky,
6 the Vice Commander at Andersen Air Force base. Colonel Joyce
7 Sohotra, the Chief of the Environmental Division,
8 Headquarters Pacific Air Forces in Hawaii, and Mr. Scott
9 Whittaker, the Environmental Chief at Andersen Air Force
10 Base.

11 Attending this evening from the 36th Air
12 Expeditionary Wing at Andersen Air Force Base: The Civil
13 Engineer, Lt Col Marvin Smith, the Community Planner,
14 Mr. Paul Hughey, the Conservation Officer, Mr. Dana Lujan,
15 and the Public Affairs Officer, Lt Genevieve David.

16 As I mentioned earlier, I represent the Judge
17 Advocate General's Office from Headquarters Pacific Air
18 Forces.

19 From the private consulting firm assisting the
20 Air Force with the Programmatic EIS, Parsons, we have:
21 Mr. RC Wooten and Ms. Brynna McNulty.

22 We will begin our presentation with Colonel
23 Wolborsky.

24 COL WOLBORSKY: Thank you, Lt Col Kendrick.
25 Good evening, ladies and gentlemen. I'm Col Steve Wolborsky,

1 the 36th Air Expeditionary Wing Vice Commander at Andersen
2 Air Force Base, and I would like to welcome you. We
3 appreciate your taking the time to join us this evening.

4 Andersen plays an important role in the defense
5 of our nation. Guam, Hawaii and Alaska form a "strategic
6 triangle" - a wedge from which the United States can project
7 airpower to demonstrate the commitment to regional security
8 and engagement, assure our allies, and dissuade or deter
9 aggression in the Asia-Pacific region.

10 We do this in a number of ways. For example,
11 the continuous bomber presence on Andersen deters potential
12 aggressors. In addition, our refueling, maintenance, and
13 munitions capabilities support military activities around the
14 world, including the global war on terror. The war on terror
15 has taught the military that we must be able to change the
16 way we do business to meet new threats to our country. That
17 is why we are here tonight. The Air Force is proposing a
18 change to the way we operate our forces so we are better able
19 to defend America.

20 To support our military strategy, the United
21 States Air Force, specifically the Pacific Air Forces
22 Headquarters in Hawaii, is planning to provide a Global
23 Strike Task Force to assure our nation's commitment to
24 regional security and peace in the Asia-Pacific region.

25 The proposed Global Strike Task Force has a

8

1 critical purpose and need:

2 The purpose of the action is to enable
3 predictive battle space awareness, to be able to know
4 critical adversary moves and respond accordingly with the
5 application of air space and power. This action is needed to
6 relocate and consolidate aircraft, personnel, and training.

7 However, before we can proceed, we must prepare
8 a Programmatic Environmental Impact Statement or a
9 Programmatic EIS in accordance with the National
10 Environmental Policy Act (NEPA) and Air Force instructions.
11 Here is where you come in. Tonight we will give you
12 preliminary information on this action. We are asking for
13 your input so please offer us your concerns, questions or
14 comments.

15 Specifically, we will present: A description of
16 the proposed action and alternatives, the schedule the Air
17 Force is working toward, and the NEPA process.

18 We will start the discussion with Colonel Joyce
19 Sohotra, the Environmental Division Chief at the Pacific Air
20 Forces.

21 COL JOYCE SOHOTRA: Thank you, sir. As Colonel
22 Wolborsky has discussed, the Air Force is planning to form a
23 Global Strike Task Force on the mostly developed areas of
24 Andersen Air Force Base. The proposed site for this new

25 consolidated function is at the main base portion of Andersen

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1 Air Force Base, which represents a key strategic location in
2 the Pacific. Five key capabilities would become part of the
3 task force: Intelligence, surveillance, reconnaissance,
4 strike and refueling.

5 The proposed action includes basing of aircraft
6 on Andersen Air Force Base, stationing additional personnel
7 and families, constructing new facilities, and training air
8 crews.

9 Here is a map of the north end of Guam showing
10 the location of Andersen Air Force Base. Construction of new
11 facilities would occur primarily on the developed areas of
12 the main base currently used as an active airfield and
13 operational base by both the US Air Force and the Navy.

14 In addition, Andersen Air Force Base currently
15 has approximately 2,300 personnel. Approximately 235 average
16 daily aircraft operations are conducted within the airspace
17 of the base.

18 The Air Force initially considered six different
19 installations in the Pacific area as potential sites at which
20 the task force could be located. Based on the alternative
21 evaluation and screening process, Andersen Air Force base was
22 the only location that satisfied all selection factors used
23 to determine the location of the task force.

24 The Programmatic EIS will evaluate three
25 alternatives: 1. The no action alternative. 2. The

10

1 alternative action of rotating aircraft from other bases. 3.
2 The proposed action of basing selected aircraft on Andersen
3 Air Force Base, and rotating the rest.

4 The main difference between 2 and 3 is whether
5 the refueling aircraft are rotating or based at Andersen.

6 The no action alternative would essentially be
7 continuation of existing conditions.

8 The rotational and based aircraft alternatives
9 will be described in the next two slides.

10 The Rotational Aircraft Alternative would base
11 three Global Hawk Unmanned Aerial Vehicles, or UAVs, at
12 Andersen. Also, twelve aerial refuelers, 48 fighters, and 6
13 bomber aircraft would be rotated from other bases.

14 This action would result in an additional 1,800
15 personnel at Andersen by the year 2016. Approximately 200 of
16 these personnel would be permanently based and accompanied by
17 families.

18 Daily aircraft operations are anticipated to
19 increase by 99 to a total of 334. An aircraft operation is
20 one take-off or one landing. The additional aircraft
21 operations would be a result of the training that would be
22 accomplished by the aircrews associated with the Global
23 Strike Task Force.

24 The proposed action called the "Based Aircraft
25 Alternative" will permanently base 12 Aerial Refueler

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1 Aircraft and 3 Unmanned Aerial Vehicles at Andersen Air Force
2 Base. The 48 fighter and 6 bomber aircraft would be rotated
3 from other areas.

4 The proposed action would result in 2,400
5 additional military, civilian and contractor personnel on
6 Andersen by the year 2016. Approximately 700 of these
7 personnel would be permanently based and accompanied by their
8 families.

9 Finally, the Air Force projects an increase of
10 115 average daily aircraft operations would be a result of
11 the training required by the aircrews associated with the
12 Global Strike Task Force.

13 My next slide shows the construction needed to
14 support the proposed Global Strike Task Force initiative for
15 this alternative.

16 First of all, we would like to emphasize that
17 the Air Force will complete the environmental documents in
18 accordance with applicable laws before beginning any
19 construction at Andersen Air Force Base. In addition, we
20 will use these documents to assist in our decision making
21 process.

22 Now, the proposed Global Strike Task Force would

20 it because of your so-called superior mentality? Or is it
21 money?

22 In closing, I'd like to state for the record
23 that I am just as human as any one from the Americans or any
24 other country. Notice I mention "country." Guam is not a
25 country. It is nothing but a property so Yankees, go home.

19

1 Thank you.

2 LT COL DAVID KENDRICK: Thank you for your
3 comment. Next speaker is Greg Witteman.

4 GREG WITTEMAN: The first comment I have is
5 about the refuge overlay as it's been stated over and over.
6 It's my understanding that it's a National Wildlife Refuge
7 and should be considered such. So what's the point of having
8 one if pieces of it can disappear? Particularly this piece
9 here which is -- could be -- it's not been determined yet. I
10 was pointing to the southeast part next to the golf course.

11 What's their survey of the area in terms of
12 vegetation and habitat; that sort of a thing. And why don't
13 they get rid of all this cleared land here which is a golf
14 course and put that in there? There's plenty golf courses on
15 Guam. That would -- this area probably too acts as a buffer.
16 So that's it. All yours. Thank you very much.

17 LT COL DAVID KENDRICK: Next speaker is from
18 indigenous Chamorro first nation decent, T-a-l-a-g-i.

19 TALAGI: So it's my understanding that we're
20 bringing more military personnel to ward off terrorism.
21 Well, I want to bring up the subject of terrorism that's
22 happening on our own land. It's called mental terrorism,
23 emotional terrorism. Terrorism in the minds of children and
24 adults who have experienced World War II first hand here on
25 the island. Bombers flying back and forth. Helicopters

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1 flying lower than they're supposed to. Sailors carrying guns
2 with them while diving. Military personnel picking fights in
3 bars and giving no respect to our women. Strip clubs and
4 massage parlors.

5 Is this the economy that we're going to be
6 getting? Nuclear powered submarines crashing because people
7 haven't been studying their maps? Did you all think that we
8 forgot about the land seizures? Did you all think that we're
9 gonna forget about the war claims? Do you think that we're
10 gonna forget about the Ordot munitions dump? The Orote dump
11 that fell into the water and now people who fish there have
12 to question whether or not that fish is contaminated. Do you
13 think that we forgot about the Andersen dump that became a
14 sanitary dump just because they put a piece of plastic over
15 it? Do you think that we forgot about the mustard gas and
16 the PCBs dumped throughout our island, throughout our
17 wetlands and throughout our oceans? Are you crazy?

18 And on that note, I would like to just quote a

19 song "what in the world are we fighting for? Let the white
20 man fight the white man's war."

21 LT COL DAVID KENDRICK: Thank you for your
22 comment. Our next speaker, Paul Zerzan? Is that correct?

23 PAUL ZERZAN: Yes, that's correct.

24 LT COL DAVID KENDRICK: Affiliation says, a
25 teacher.

21

1 PAUL ZERZAN: Yeah, my understanding is that
2 Andersen is being hardened in regard to infrastructure and
3 it's being put underground. And if this is true, I'd like to
4 see that extended to all of Guam because if we make the
5 island bomb proof, we'd also make it typhoon proof. So we
6 enhance it both military but we also enhance it economically
7 and the entire people of Guam benefit. So my comment is if
8 the process of hardening Andersen is finished, if that
9 process could be extended to the civilian infrastructure of
10 Guam. Two-thirds of Guam is limestone. It's quite simple to
11 tunnel into it. It becomes quite hard and coronary on Guam.
12 So that's my comment. Thank you.

13 LT COL DAVID KENDRICK: Thank you very much.
14 Our next speaker -- I'll spell it. L-i-e-m, V-i -- and it
15 looks like N-h-o.

16 LIEM VI NHO: Hi, my name is Liem. First of
17 all, I need to thank the Air Force. Every typhoon after

18 typhoon the Air Force bring C-5 to help us to rebuild our
19 island or they deliver heavy equipment to outer island to
20 help each other. My question is -- I'm sorry, I have no
21 question about our Armed Forces offensive capability. I do
22 have a question about our Armed Forces capability on this
23 island. I believe not too long ago a China submarine sailed
24 around this island. My second question is, what are you
25 gonna do when they lodge underwater to surface weapon to this

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1 island? Thirdly, when more Armed Forces personnel came into
2 Guam, do we have the infrastructure to support your Armed
3 Forces? Are we going to become in 1982 when there's a lot of
4 tourism come to Guam and all the village have to share the
5 power? Thank you very much.

6 LT COL DAVID KENDRICK: Thank you. Next speaker
7 is Ken Rekdahl, R-e-k-d-a-h-l. Is that correct?

8 KEN REKDAHL: My name is Ken Rekdahl, President
9 of Guam Federation of Teachers. I don't really have a
10 comment because it's very difficult to comment on the
11 information that has been provided. I understand it's still
12 in the preliminary phase but if you truly want constructive
13 input from the community, we need to be provided with a
14 little bit more information than what I can gather from here.
15 So if there's an additional information on this project, its
16 proposed layout, its foreseen impacts. If that could be
17 provided to the public before the June 30th deadline, then

18 you can get a little bit more constructive criticism from the
19 community. That's all.

20 LT COL DAVID KENDRICK: Thank you very much.
21 This is the last call for anybody who would like to voice
22 your comment tonight. I have one hand. Any other? Anybody
23 else? Will you please fill it out and then come on up.
24 Antonio Sablan.

25 ANTONIO SABLAN: Quite frankly, I've been -- I

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1 just arrived back on the island and I'm not prepared to
2 chastise you guys totally on this because I intend to but in
3 all preparation to fortify your so-called base, what have you
4 planned to, number one, continue to give access to people
5 that have land in Jinapsan and Urunao? The landowners over
6 there. Number two, what have you really considered about
7 compensating the landowners like my friend for the
8 independent task force, which I am one, is that he brought up
9 the idea that the concept that United States have entered
10 into a treaty that gave Guam the rights -- the Chamorro
11 people of Guam the rights to self retaliation and why is the
12 United States not doing anything to advance that? Why is the
13 United States pretty much lining pockets in using our real
14 estate?

15 A tune of gentlemen earlier mentioned, thank you
16 for the C-5 when they come in with the generators and stuff

17 like that after typhoon. In my opinion, that's a token price
18 of what you guys are benefiting from our island. This island
19 defends the United States. The entire economy of the United
20 States could go just fumbling down without our presence
21 because really, quite frankly, you guys don't have any other
22 place and nobody wants you around the Pacific. Even the
23 Filipinos that are running to the United States kicked you
24 out of their country. You guys are abusing your rights.
25 The Chamorro are the homeland people of Guam and now we're

24

1 lining behind 200, 300 people applying for the same position?
2 What are you doing to benefit the mallenders? My people.
3 The people of Guam that you say this is economic advantages.
4 To line up the pockets for the people down at
5 the Chamber of Commerce and their cabal and they're saying
6 yeah, yeah, yeah. What about my people? My people are --
7 our kids are getting to be unemployed and nothing is
8 benefiting from it. A token is a benefit but for the most
9 part we're not participating in this economy development. I
10 -- P.S., man, give me one minute.

11 This whole piece of property was given to my
12 mother and her brothers and sisters and when guys took it
13 from my mother, one acre of land, cannot even buy 12 dozen of
14 chicken eggs. And then you guys have the audacity to sell it
15 for Half a Million Dollars to GovGuam at the time. You guys
16 paid us something like \$80,000 for the entire 5,000 acres.

17 I've always thought the parameter is that you guys have never
18 taken it, it's still my family's property? And you guys are
19 now trying to develop down there? What is the compensation?
20 Doesn't the US Constitution say fair compensation for any
21 kind of condemnation? Return our land.

22 I'm willing to sit down with America and have
23 America pay us 2 to 4 Billion Dollars a year in rental value
24 of our land. America does not have the right to condemn. It
25 is nothing but a foster parent who is raping the benefits and

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1 the assets of the foster child. Gentleman says, pack up and
2 go. I'm a lot more lenient. But saying, let's sit down and
3 you pay the price and let's see that our people, the
4 homelander benefit from our island, from the benefits from
5 your usage of our island, endangering our life.

6 Make us benefit from it, not you pretty much
7 alienate us in our homeland and we become the minority, we
8 become the poor people and we become the people looking for
9 jobs because we can't compete with outsiders who are willing
10 to take your tokenism in payment. Pay us what we deserve.
11 We own one prime real estate in a strategic location.
12 America has done nothing but stole and stole and continues to
13 steal from my people.

14 Now, I don't want any further development. It
15 only benefits outsiders.

16 LT COL DAVID KENDRICK: Is there any other
17 comment card tonight? Anybody else want to make a comment?
18 If there are no other persons wishing to make a comment, we
19 appreciate your support and I thank you for coming to our
20 meeting tonight.

21 A final reminder. The comment period for the
22 Notice of Intent in the scoping process is open until June
23 30, 2005. Therefore, any written comments that you wish to
24 submit to the Air Force should be mailed to: Environmental
25 Flight, 36 CES/CEV, Unit 14007, APO, AP 96543-4007.

26

1 Fax is also available for your convenience at
2 671.366.5088. Once again, if you have not already done so,
3 please be sure you have signed a registration form. Also be
4 sure you have turned in any completed written comment sheets,
5 or you may mail them before the deadline.

6 For the record, the time is now 6:56 p.m. This
7 scoping meeting is formally concluded.

8 Thank you again for taking part in this planning
9 process and for your time with us tonight. Thank you.

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REPORTER'S CERTIFICATE

I, Cecille A. Flores, a Certified Shorthand Reporter, do hereby certify the foregoing 26 pages to be a true and correct transcript of the stenographic shorthand notes taken by me in the within proceedings at the time and place as set forth herein.

Dated at Barrigada, Guam this 28th day of July 2005.

Cecille A. Flores

Certified Shorthand Reporter

CSR. No FL-OR-EC-A197NA

James Pigg
4851 Quail Run
Las Cruces, NM 88011

18 May 2005

Mr. Scott Whittaker
Environmental Flight Chief
Unit 14007
APO AP 96543-4007

Re: Draft Programmatic Environmental Impact Statement for Basing a Global Strike Task Force, Andersen Air Force Base, Guam

Dear Mr. Whittaker:

Please place my name and address on the mailing list for public comments for the Draft PEIS. After the scoping process in the event that copies are provided for public comment, I would appreciate an electronic copy of any documents.

As a former B-52 pilot and charter member of the "100 wasted hours on the Andersen Ramp Club" during the Vietnam War, the proposed basing plans are of interest to me.

James Pigg
4851 Quail Run
Las Cruces, NM 88011

Thanks,


Jim Pigg

SPEAKER REQUEST CARD # 1

**SCOPING MEETING: PROGRAMMATIC EIS FOR GLOBAL STRIKE TASK FORCE
ANDERSEN AIR FORCE BASE, GUAM**

☒ **YES, I WISH TO MAKE A VERBAL COMMENT
AT TONIGHT'S SCOPING MEETING.**

Your Name (please print): Greg Wittenman

Affiliation: Univ. of Guam

Street Address: Biology - CNAS

City, State, Zip: Magazied GU

Phone and/or email (optional): _____

James Pigg
4851 Quail Run
Las Cruces, NM 88011

18 May 2005

Mr. Scott Whittaker
Environmental Flight Chief
Unit 14007
APO AP 96543-4007

Re: Draft Programmatic Environmental Impact Statement for Basing a Global Strike Task Force, Andersen Air Force Base, Guam

Dear Mr. Whittaker:

Please place my name and address on the mailing list for public comments for the Draft PEIS. After the scoping process in the event that copies are provided for public comment, I would appreciate an electronic copy of any documents.

As a former B-52 pilot and charter member of the "100 wasted hours on the Andersen Ramp Club" during the Vietnam War, the proposed basing plans are of interest to me.

James Pigg
4851 Quail Run
Las Cruces, NM 88011

Thanks,


Jim Pigg

SPEAKER REQUEST CARD #3

**SCOPING MEETING: PROGRAMMATIC EIS FOR GLOBAL STRIKE TASK FORCE
ANDERSEN AIR FORCE BASE, GUAM**

☒ **YES, I WISH TO MAKE A VERBAL COMMENT
AT TONIGHT'S SCOPING MEETING.**

Your Name (please print): Talāgi

Affiliation: Indigenous Chamoru "First-Nation" descendant

Street Address: N/A

City, State, Zip: N/A

Phone and/or email (optional): N/A

withdwn

SPEAKER REQUEST CARD # 4

SCOPING MEETING: PROGRAMMATIC EIS FOR GLOBAL STRIKE TASK FORCE
ANDERSEN AIR FORCE BASE, GUAM

☒ **YES, I WISH TO MAKE A VERBAL COMMENT
AT TONIGHT'S SCOPING MEETING.**

Your Name (please print): JOEL F TRIVAUDIN

Affiliation: _____

Street Address: }

*Address deleted for
privacy considerations*

City, State, Zip: _

Phone and/or email (optional): _

SPEAKER REQUEST CARD # 5

**SCOPING MEETING: PROGRAMMATIC EIS FOR GLOBAL STRIKE TASK FORCE
ANDERSEN AIR FORCE BASE, GUAM**

☒ **YES, I WISH TO MAKE A VERBAL COMMENT
AT TONIGHT'S SCOPING MEETING.**

Your Name (please print): Paul Zerzan

Affiliation: Teacher

Street Address:

City, State, Zip:

*Address deleted for
privacy considerations*

Phone and/or email (optional):

SPEAKER REQUEST CARD # 6

**SCOPING MEETING: PROGRAMMATIC EIS FOR GLOBAL STRIKE TASK FORCE
ANDERSEN AIR FORCE BASE, GUAM**

☒ **YES, I WISH TO MAKE A VERBAL COMMENT
AT TONIGHT'S SCOPING MEETING.**

Your Name (please print): LIEM VI NHO

Affiliation: _____

Street Address: _____

*Address deleted for
privacy considerations*

City, State, Zip: _____

Phone and/or email (optional): _____

SPEAKER REQUEST CARD #7

**SCOPING MEETING: PROGRAMMATIC EIS FOR GLOBAL STRIKE TASK FORCE
ANDERSEN AIR FORCE BASE, GUAM**

☒ **YES, I WISH TO MAKE A VERBAL COMMENT
AT TONIGHT'S SCOPING MEETING.**

Your Name (please print): Ken Repach

Affiliation: _____

Street Address: _____

*Address deleted for
privacy considerations*

City, State, Zip: _____

Phone and/or email (optional): _____

SPEAKER REQUEST CARD # _____

SCOPING MEETING: PROGRAMMATIC EIS FOR GLOBAL STRIKE TASK FORCE
ANDERSEN AIR FORCE BASE, GUAM

☒ **YES, I WISH TO MAKE A VERBAL COMMENT
AT TONIGHT'S SCOPING MEETING.**

Your Name (please print):

ANTONIO A. SABL

Affiliation:

self

Street Address:

City, State, Zip:

GUAM

Phone and/or email (optional):

June 7, 2005

Scott Whittaker
Environmental Flight Chief
Unit 14007
APO AP 96543-4007

Department of the Air Force
Attn: Environmental Flight
36 CES/CEV, Unit 14007
APO, AP 96543-4007

Re: Scoping Comments in Response to May 18, 2005 Notice of Intent to Prepare a Draft
Programmatic Environmental Impact Statement for Basing a Global Strike Task
Force, Andersen Air Force Base, Guam (70 Fed. Reg. 28,517)

Dear Mr. Whittaker,

I submit these scoping comments in response to the U.S. Air Force's May 18, 2005 Notice of Intent (NOI) to Prepare a Draft Programmatic Environmental Impact Statement for Basing a Global Strike Task Force, Andersen Air Force Base, Guam (70 Fed. Reg. 28,517). I am a member of the Guam Micronesian Kingfisher Recovery Committee established by the U. S. Fish and Wildlife Service in July 2001. This committee constructed and has begun implementing a plan to restore native birds, including the Guam Micronesian Kingfisher, to Guam. Anderson Air Force Base has been represented on this committee since its origin, and through their representative has helped formulate this plan. Among the accomplishments to date, the return of Guam Micronesian Kingfishers to Guam, in the form of captive birds held in new aviary facilities, represents a highlight. Significant future elements of the plan include the experimental release of species such as the Mironesian Honeyeater, extinct on Guam but surviving on other islands, slated for 2005-2006, and release of Guam Micronesian Kingfishers into the wild, planned for 2008.

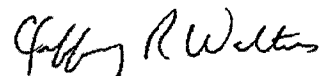
I and other members of the Recovery Committee are intensely interested in any plans for Anderson Air Force Base because its Northwest Field is generally regarded as the best native forest remaining on Guam. That the remaining Marianas Crows dwell there is an indicator of this. More significantly, Northwest Field was identified as the release site for both initial releases of species such as honeyeaters and ultimately kingfishers. Specifically our plan identifies the Munitions Storage Area as the primary release site, and calls for the construction of a snake barrier around it. Hence alterations to the base that impact the habitat within Northwest Field could compromise the restoration plan for Guam's native birds that we have carefully constructed and so successfully carried out to date. Anderson Air Force Base has been an important partner in the development of the restoration plan, and indicated its commitment to use of Northwest Field as a critical environmental site in its recent Integrated Natural Resource Management Plan. Indeed, the only reason that the U.S. Fish and Wildlife Service excluded the Northwest Field from its recent critical

habitat designation for Guam's endangered fauna was the commitment expressed in the INRMP to dedicate Northwest Field to providing benefits to these species (69 Fed. Reg. 62,944, 62,953; Oct. 28, 2004).

I am concerned that the proposed project may involve facility construction that will eliminate forest habitat within Northwest Field. Unfortunately the Federal Register notice provides no specifics about facility construction, so it is not possible to determine if this is the case. It is not possible to determine whether all construction will occur in places other than Northwest Field, so that the proposed action is compatible with our plan for restoration of native birds, or represents a proposal to eliminate important habitat and thereby undermine the restoration plan and the commitments to it indicated in the INRMP. **The environmental impact statement must address the impact that the action will have on the plan for restoring Guam's native birds. It is also imperative that it include all alternatives considered, as they likely differ greatly in their impact on endangered birds. I urge you to select as your preferred alternative one in which new construction occurs in areas other than the native forests of Northwest Field.** I have worked with endangered species on a number of military bases, and learned that, with careful planning and coordination, effective conservation of such species can be compatible with executing a base's military mission. I am sure this is the case on Guam as well.

I appreciate the opportunity to provide these initial scoping comments and look forward to providing additional comments on the environmental impact statement. In the meantime, please feel free to contact me should you wish to discuss my comments (540-231-3847; jrwalt@vt.edu).

Sincerely,



Jeffrey R. Walters
Bailey Professor of Biology

SPEAKER REQUEST CARD # _____

SCOPING MEETING: PROGRAMMATIC EIS FOR GLOBAL STRIKE TASK FORCE
ANDERSEN AIR FORCE BASE, GUAM

☒ **YES, I WISH TO MAKE A VERBAL COMMENT
AT TONIGHT'S SCOPING MEETING.**

Your Name (please print):

Maga Aniti

Affiliation:

Independence

Street Address:

City, State, Zip:

Phone and/or email (optional):

June 8, 2005

Hafa Adai:

I am here today declaring openly, my opposition to the planned military buildup on Guam!! I know that for your planners, Guam is first and foremost, a property held specifically for the advance knowledge of being attacked by America's enemies. In other words totally expendable/first to go! What other reason do you have anyway?

America has made the people on Guam, especially the indigenous, believe they are actually American citizens when in reality, they're not. I have read your constitution that states a citizen's rights. Article 2, Section 8 of the constitution states that when a treaty is signed, then that treaty supersedes the constitution! That treaty was signed in 1946—Decolonization Committee, United Nations. But in 1950, Congress in its arrogance, wrote the Organic Act. Your actions since the Spanish-American war of 1898 till today has shown nothing but contempt and deceits. Just admit publicly that America owns Guam, lock, stock and barrel and that nothing we say or do has any value. It is known that values based on property is called ownership, to do as one pleases. Guam is an unconstitutional property. There are no U.S. citizens on Guam, the constitution does not apply to Guam. Are you going to pay war reparations or just delaying further because you know Guam needs only one nuclear bomb then no more nothing. Why must the people of and immigrants on Guam die in time of war. Why can't you honor your constitution? Is it because of your so-called superior mentality?

In closing, I'd like to state for the record that I am just as human as any one from the Americas or any other country. Notice I mentioned country. Guam is not a country; it is nothing but a property. SO, YANKEE GO HOME!!!



WRITTEN COMMENT SHEET

PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT: GLOBAL STRIKE TAKS FORCE ON ANDERSEN AIR FORCE BASE, GUAM

Thank you for attending this public scoping meeting. Our purpose for hosting this meeting is to give you an opportunity to assist us in identifying pertinent environmental issues for analysis in a Draft Programmatic Environmental Impact Statement (EIS). The Draft Programmatic EIS will: evaluate potential effects of basing or rotating military aircraft and personnel on Andersen AFB in support of the need to establish an intelligence, surveillance, reconnaissance strike and refueling capability in the Pacific region. Please use this sheet to bring to our attention potential environmental issues that you feel should be analyzed in the EIS. You may use the back of this sheet if necessary.

Please print your comments below:

Date: 6-9-05

Nationally - Internationally this is very important in processing the war on terror. Locally, it provides security for Guam as well as the potential for high skilled and other important economic opportunities for Guam.

Obviously the plant must not pollute our water resources; it must have an environmentally safe method for disposal of waste water; it properly assess and mitigate environmental impact including wildlife and cultural/historical sites. I'm confident the AF is sensitive to these concerns and will address them in a responsible manner.

Your Name (please print):

L. CARL PETERSON, CFP

Affiliation:

Address deleted for

Street Address:

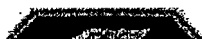
privacy considerations

City, State, Zip:

Phone Number (opt

email (optional):

Please hand this form in tonight, or mail it to:





WRITTEN COMMENT SHEET

PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT: GLOBAL STRIKE TAKS FORCE ON ANDERSEN AIR FORCE BASE, GUAM

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Please print your comments below:

Date: 10 JUNE 2005

AS A GUAM RESIDENT, AND AS A LOCAL ELECTED OFFICIAL, I SUPPORT
INCREASED MILITARY ACTIVITY IN GUAM. I SUPPORT AND WELCOME
THE "GSTF" PROGRAM. I FEEL THAT THE MAJORITY OF GUAM RESIDENTS
SUPPORTS THE BASING OF THE "GSTF". I REQUEST THE PLANNERS OF
THIS PROGRAM TO CONSIDER THE FOLLOWING:

1. FOR THE CONSTRUCTION OF FACILITIES, PLEASE GIVE PREFERENCE
TO LOCAL COMPANIES FOR THE PROJECTS.
2. FOR DIRECT HIRING OF PEOPLE, PLEASE GIVE PREFERENCE TO LOCAL
PEOPLE.
3. CONSIDER THE CIVILIAN HOUSING MARKET FOR THE "GSTF" NEEDS.
THIS IS GOOD FOR THE LOCAL HOUSING MARKET, AND IT MIGHT "SAVE"

Your Name (please print): ADOLPHO B. PALACIOS, SR.

Affiliation: GUAM SENATOR, 28TH. GUAM LEGISLATURE

Street Address: _____

City, State, Zip: F _____

Phone Number (or _____

email (optional): _____

*Address deleted for
privacy considerations*



Please hand this form in tonight, or mail it to:

Mr. Scott Whittaker
Environmental Flight Chief
Unit 14007
APO AP 96543-4007

Your letter must be postmarked by **June 30, 2005** to ensure consideration in the Draft EIS

WRITTEN COMMENT SHEET (Continued)

PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT: GLOBAL STRIKE TASK FORCE ON ANDERSEN AIR FORCE BASE, GUAM

Continued from other side:

SOME OF THE LAND AREA FROM BEING ALTERED WITH CONSTRUCTIONS.

4. TO THE EXTENT PRACTICABLE, PRESERVE LOCAL PLANTS AND ANIMALS,
AND LOCAL HISTORICIA/ SITES. LOCAL PEOPLE ARE VERY SENSITIVE
WHEN IT COMES TO LOCAL CULTURE AND HISTORY.

5. CONSIDER A "DEFENSE SEAL" PROGRAM FOR GUAM, IN THE EVENT
OF ENEMY ATTACK. A DEFENSE SEAL WOULD REDUCE THE FEAR THAT
THE "GSTF" PROGRAM WOULD MAKE GUAM A "VALUABLE" ENEMY TARGET.

END.....

Your Name (please print):

Adolfo B. PALACIOS, SR.
AdPalacios



WRITTEN COMMENT SHEET

PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT: GLOBAL STRIKE TAKS FORCE ON ANDERSEN AIR FORCE BASE, GUAM

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Please print your comments below:

Date:

4/9/05

SEE ATTACHED

Your Name (please print): MIKE CARL

Affiliation: GUAM ECONOMIC DEV + COMMERCE AUTHORITY

Street Address: _____

City, State, Zip: _____

Phone Number (optional): _____

email (optional): _____

*Address deleted for
privacy considerations*

Please hand this form in tonight, or mail it to:

Aturidad Inadilanton

Governor
Felix P. Camacho



Ikunumihan Guahan

Lieutenant Governor
Kaleo S. Moylan

June 9, 2005

Mr. Scott Whittaker
Chief, Environmental Flight
36 CES/CEV, Unit 14007
Department of the Air Force
APO, AP 96543-4007

RE: Proposed Global Strike Task Force DPEIS, Andersen Air Force Base

Hafa Adai Mr. Whittaker:

Pacific Air Forces is proposing to develop a Draft Programmatic Environmental Impact Statement concerning the basing of 3 Global Hawk Unmanned Aerial Vehicles (UAV) and 12 refueling aircraft in addition to rotating 48 fighter and 6 bomber aircraft at Andersen Air Force Base. The Guam Economic Development and Commerce Authority has given consideration to this project and recognizes that the addition of these activities and 2,400 additional military, civilian and contractor personnel is consistent with Governor Felix Camacho's policy initiative of increasing military presence in Guam. Guam is America's westernmost outpost and has significant military value as a strategic platform for UAV, Intelligence, Surveillance, and Reconnaissance (ISR) and fighter, bomber and tanker missions, as detailed in the Air Force Report, Volume V of the DoD's Base Realignment and Closure Report dated May 2005.

As the purpose of the Notice of Intent is to solicit input on environmental issues that should be considered in the preparation of the DPEIS, GEDCA provides the following comments to ensure that both the needs of the military and the civilian community are addressed:

- Permanent basing of fighter and bomber aircraft at AAFB should be considered in the DPEIS even though current intent and practice is to rotate these aircraft. Should PacAF decide in the future to permanently base these aircraft at AAFB, NEPA requirements would have already been met. In addition, substantially more economic benefits will accrue to Guam under a permanent basing scenario,

these requirements, identify future business opportunities. Skill requirements of operations and maintenance staff should be identified early on, so that employment programs and training curricula can be established to satisfy this potential industry.

- The economic impacts of construction and the basing of an additional 2400 personnel in Guam in addition to the cumulative impact resulting from the Air Force's proposed beddown project at Northwest Field should be quantified. It is our belief that Guam's infrastructure can handle this increase in population.
- The DPEIS should address the potential for military families to be stationed here, and the potential for these families to be housed in civilian housing, via private sector leases or public/private housing development ventures.
- The DPEIS should evaluate the effect of the project on potentially releasable lands that were contained in the 1994 Guam Land Use Plan as well as any isolated pockets of land outside the primary military installation.
- The DPEIS should analyze the effect of the project on development plans of private landowners in the Jinapsan, Urunao, Ritidian and Janom areas including their ability to access their properties, utilities and infrastructure.
- The DPEIS should address the ability of the project to support joint services training and use of facilities and the potential increases in personnel that may result from joint services use.

We applaud the Air Force for its continuing commitment to Guam and expanding Guam's role as the Leading Edge of America's Defensive Triangle. We look forward to reviewing the draft environmental impact statement. Thank you for the opportunity to provide comments.

Sincerely,



ALBERTO A. C. LAMORENA
Acting Administrator



Felix P. Camacho
Governor

Kaleo S. Moylan
Lt. Governor

Department of Agriculture Dipattamenton Agrikottura

142 Dairy Road, Mangilao, Guam 96913

Director's Office	734-3942/43; Fax 734-6569
Agricultural Development Services	734-3946; 735-3946; 735-3950
Plant Nursery	734-3949
Aquatic & Wildlife Resources	735-3955/56; Fax 734-6570
Forestry & Soil Resources	735-3949/51; Fax 734-0111
Plant Inspection Station	475-1426/27; Fax 477-9487



Paul C. Bassler
Director

Joseph D. Torres
Deputy Director

June 22, 2005

Mr. Scott Whittaker
Environmental Flight Chief
Department of the Air Force
36 CES/CEV (Unit 14007)
APO, AP 96543-4007

Subject: Intent to prepare a Draft Programmatic Environmental Impact Statement for the proposed Global Strike Task Force (GSTF) basing on Andersen Air Force Base (AAFB), Guam

Dear Mr. Whittaker:

Thank you for the opportunity to comment on the preparation of the Draft Programmatic Environmental Impact Statement (EIS) for the proposed GSTF basing on AFB, Guam. The mission of Guam Agriculture's Division of Aquatic and Wildlife Resources (DAWR) is to "manage Guam's wildlife resources for cultural, recreational, and economic benefit of present and future generations" with a vision "to recover endangered animal and plant species, manage sustainable populations of game species, and promote public awareness of natural resources."

First and foremost, DAWR would like to see in the Draft EIS the analysis used to determine that Andersen Air Force Base, Guam is the preferred alternative for the proposed basing of the proposed GSTF. The proposed activities must be fully disclosed and the environmental consequences of all alternatives must be analyzed to determine the preferred alternative. Only then will the public be informed and ensured that the Air Force is satisfying Congress's requirement to make a fully informed decision on the proper course of action.

The Air Force coordinated several meetings with DAWR and other natural resource agencies about the proposed GSTF. The following is a list of concerns we feel should be addressed in the Draft EIS:

1. Forest habitat that will be lost due to the construction of aircraft staging facilities and housing for the increase in personnel. The Draft EIS should address how the military will work with DAWR to select construction sites that will minimize impacts, both quantity and quality, to native forest habitat. For example, plant surveys will be needed to determine locations which will have the least impact on certain species that Mariana crows (*Corvus kubaryi*) and other endangered native bird species depend on, including *Eleaocarpus joga*, *Tristiropsis obstusangula*, and *Intsia bijuga*, as well as endangered trees and plants.
2. The Draft EIS should address how the Air Force intends to mitigate the loss of primary and secondary forest habitat. Both are highly valuable to the Mariana Fruit bat (*Pteropus mariannus*), *C. kubaryi*, and other endangered bird species. For example, an acceptable mitigation project would be the Air Force implementing a reforestation project. In addition, it would be beneficial for the Air Force to institute a base-wide ungulate control program to insure reforestation efforts are maximized and the root of the problem minimized. This program should include removal and control of ungulates from areas that are important to native species, out-planting of native species, and protection of reforested areas from reintroduction of ungulates.
3. The basing of additional personnel on AAFB will require the construction of new facilities and housing. Plans provided at the scoping meeting indicate building the additional housing within the forested area between the golf course and cliffline on the eastern portion of AAFB. Although there is a mix of *Leucaena leucocephala*, tangantangan, and native species along the edge of the golf course, this strip is very thin. This mix of *L. leucocephala* provides a buffer against more aggressive invasive alien species from encroaching into native primary forest. The clearing of vegetation in these forested areas will allow predispose native forests to invasive alien species that will out-compete native species. The east side of AAFB is already a narrow strip of forest and any further development will jeopardize this corridor of habitat for native animals.
4. We feel that the new housing requirements can be met by utilizing the golf course while still maintaining a buffer between new construction and forest edge. The Draft EIS should address how the AF intends to deal with this problem.

5. AAFB sits directly over Guam's aquifer. The Draft EIS should indicate the possible impacts to the aquifer and the measures that will be taken to protect Guam's drinking water.
6. There will be a significant increase in noise from air traffic and construction associated with basing of a GSTF at AAFB, Guam. The impacts to native endangered species will rise substantially. The Draft EIS should address how the military will minimize these impacts to native wildlife.
7. Access to AAFB has never been a problem and the AF has been an excellent partner with conservation efforts. The Draft EIS should address any and all issues that may impede access for natural resource agencies by basing a GSTF on AAFB, Guam. Impeding access will not allow DAWR and other agencies to complete their missions of conservation.
8. The influx of hundreds of military personnel and activities related to basing additional personnel at AAFB, Guam will produce negative impacts on natural resources. The demand for recreational areas will be increased and quality of life issues will need to be addressed. The Draft EIS should address how the Air Force plans to incorporate planning for personnel quality of life issues while still maintaining the need to conserve habitat for native endangered species.
9. The EIS should look at the potential impacts of brown treesnakes on other areas of the Pacific. The probability of a brown treesnake leaving Guam on a military aircraft or within household goods will rise proportionately with the increase in air traffic, and movement of personnel and cargo from Guam.
10. The Draft EIS should also address the cumulative impacts of the proposed basing of a GSTF with respect to past and future development projects on AAFB.

Thank you for allowing us to comment on the scoping for the Draft Programmatic Environmental Impact Statement for the proposed Global Strike Task Force (GSTF) basing on Andersen Air Force Base (AFB), Guam. We look forward to the completion of the document. For more information contact Celestino F. Aguon, Acting Chief, at 735-3979.

Sincerely,



PAUL C. BASSLER



Commonwealth of the Northern Mariana Islands
Office of the Governor
Department of Lands and Natural Resources

Palmer Base
P.O. Box 10007
Saipan, Mariana Islands 96950

Cable Address:
Gov. FMJ Saipan
Telephone: 322-9830/9834/9854
Fax: 322-2633

June 16, 2005

Scott Whittaker
Environmental Flight Chief
Unit 14007
APO AP 96543-4007

Dear Mr. Whittaker,

On May 18, 2005, the Department of Defense (DOD) published in the *Federal Register* a notice of intent to prepare a Draft Programmatic Environmental Impact Statement for basing a Global Strike Force, Andersen Air Force Base. This letter therefore represents the concerns of the Commonwealth of the Northern Mariana Islands (CNMI) Department of Lands and Natural Resources (DLNR).

The CNMI DLNR would like the EIS to specifically address the risk of spreading the brown tree snake to the CNMI and other Pacific Islands with the proposed base expansion. The draft EIS should also address the ecological, economical, and human health impacts as they relate to a potential brown tree snake introduction in the CNMI and other Pacific Islands. Similarly, the draft EIS should address how the brown tree snake can be suppressed on Guam to further reduce the risk of brown tree snake introductions on the CNMI and other Pacific Islands.

With the proposed expansion it is critical for Andersen Air Force Base to provide the resources necessary to provide direct and indirect support for 100% of brown tree snake interdiction activities, which should include military goods, vehicles, cargo, household items related to military exercises and the civilian sector.

The CNMI is particularly concerned with the cumulative effects of proposed Andersen Air Force Base and Naval expansions on Guam as they related to natural and economic resources in the CNMI and other Pacific Islands.

Sincerely,

Richard Seman
Secretary, CNMI Department of Lands and Natural Resources

18 June 2005

Mr. Scott Whittaker
Chief, Environmental Flight
Unit 14007
Department of the Air Force
Andersen Air Force Base
APO, AP 96543-4007

Re: Comments on the Notice of Intent to Prepare a Draft Environmental Impact Statement for a Global Strike Task Force based on Andersen Air Force Base (AFB), Guam

Dear Mr. Whittaker:

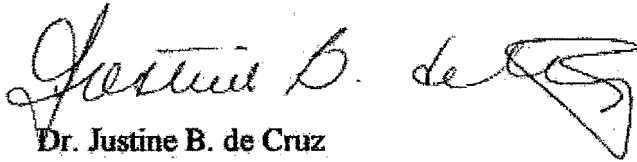
Thank you for notifying me of the Air Force's intent to prepare a programmatic environmental impact statement (EIS) for the proposed basing of a Global Strike Task Force at Andersen AFB. As the former Wildlife Section Supervisor/Ornithologist for the Division of Fish and Wildlife (Department of Lands and Natural Resources) of the Commonwealth of the Northern Mariana Islands (CNMI), I am most concerned about the impact this change will have on habitat that is essential for the survival and recovery of Guam's endangered avifauna.

It appears that the draft EIS is only going to describe and evaluate the Proposed Action, one Alternative Action that involves more rotation of flights, and a No Action Alternative. Because there does not appear to be much distinction between the Proposed Action and the Alternative Action, I urge the Air Force to reconsider the number of alternatives presented. Several serious and reasonable options (not variations on a theme) need to be considered in the EIS so that an honest evaluation can be made. Hopefully one such alternative will include the other bases that were considered for this deployment where the environmental impact of increased infrastructure and military construction might be considerably less than on Guam.

An increase in training and flight missions will occur with the implementation of the Proposed Action. Also, because increases in military personnel will be accompanied by increases in civilian and military support people, there will be increased needs for housing and operational facilities and an increased demand for recreational opportunities. These changes may significantly decrease the amount of forest habitat on Andersen AFB, and thus, the future of the endangered species that are dependent on that habitat may be negatively affected. The EIS must thoughtfully address endangered species and biological concerns, offer an in-depth analysis of the alternatives considered, and assess measures to avoid and reduce the risk to species in order for meaningful evaluation of the options to occur.

I have appreciated the opportunity to comment on the notice of intent to prepare a draft EIS for a Global Strike Task Force to be based on Andersen AFB and look forward to commenting further on the EIS for this project.

Sincerely,

A handwritten signature in cursive script, reading "Justine B. de Cruz", followed by a stylized flourish or mark.

Dr. Justine B. de Cruz
Former Wildlife Supervisor
Division of Fish and Wildlife
Commonwealth of the Northern Mariana Islands

cc: David Henkin, Earth Justice



EARTHJUSTICE

BOZEMAN, MONTANA DENVER, COLORADO HONOLULU, HAWAII
INTERNATIONAL JUNEAU, ALASKA OAKLAND, CALIFORNIA
SEATTLE, WASHINGTON TALLAHASSEE, FLORIDA WASHINGTON D C
ENVIRONMENTAL LAW CLINIC AT STANFORD UNIVERSITY

FAX TRANSMITTAL MEMO

TO: Scott Whittaker, Environmental Flight Chief
FAX #: (671) 366-5088
FROM: Lori Baker, Earthjustice Summer Associate
DATE: June 17, 2005
RE: Scoping Comments in Response to May 18, 2005 Notice of Intent to Prepare a Draft Programmatic EIS for Basing a Global Strike Task Force, Andersen Air Force Base, Guam (70 Fed. Reg. 28,517)

TOTAL PAGES (including cover memo): 4

Please consider the attached scoping comments in preparing the Draft Programmatic EIS for Basing a Global Strike Task Force at Andersen Air Force Base, Guam.

Sincerely,

Lori Baker

The information contained in this fax message is confidential information intended only for the use of the individual(s) or entity(ies) named above. If the reader of this message is not the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this communication is strictly prohibited. If you receive this communication in error, please immediately notify the sender by telephone and return the original of this transmittal to the sender at the address below via US Postal Service. Thank you.


EARTHJUSTICE
Because the earth needs a good lawyer

 BOZEMAN, MONTANA DENVER, COLORADO HONOLULU, HAWAII
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 ENVIRONMENTAL LAW CLINIC AT STANFORD UNIVERSITY

June 15, 2005

By U.S. Mail and Facsimile Transmission

 Scott Whittaker
 Environmental Flight Chief
 Unit 14007
 APO AP 96543-4007
 Fax No.: (671) 366-5088

Re: Scoping Comments in Response to May 18, 2005 Notice of Intent to Prepare a Draft Programmatic Environmental Impact Statement for Basing a Global Strike Task Force, Andersen Air Force Base, Guam (70 Fed. Reg. 28,517)

Dear Mr. Whittaker,

I submit these scoping comments on behalf of Earthjustice in response to the U.S. Air Force's May 18, 2005 Notice of Intent ("NOI") to Prepare a Draft Programmatic Environmental Impact Statement for the proposed basing of a Global Strike Task Force ("GSTF") at Andersen Air Force Base ("AFB"), Guam (70 Fed. Reg. 28,517). The NOI makes it clear the Air Force intends to dramatically increase its activities at Andersen AFB. However, it fails to provide meaningful information regarding the scope and magnitude of the proposed "facility construction, addition, and alteration projects" and fails to identify how and where the Air Force plans to accommodate: the basing of three Global Hawk aircraft and twelve aerial refueling aircraft at Andersen AFB; the rotation to Andersen AFB of forty-eight fighter and six bomber aircraft; and the addition of 2,400 military, civilian and contractor personnel. 70 Fed. Reg. at 28,517. Moreover, the NOI provides only cursory information regarding the activities the GSTF will undertake and why Andersen AFB is the preferred basing location. Without this critical information, the public cannot participate meaningfully in the Air Force's scoping process to ensure it will adequately "[d]etermine the scope and the significant issues to be analyzed in depth in the environmental impact statement," as required by the National Environmental Policy Act ("NEPA"). 40 C.F.R. § 1501.7(a)(2).

To satisfy its legal obligations, the Air Force must provide far greater detail in its NOI regarding what the GSTF project proposal entails so that interested members of the public can participate meaningfully in the entire environmental review process. This mandate is reflected in the Air Force's own NEPA regulations, which state that scoping is intended to allow "early and more meaningful participation by the public." 32 C.F.R. § 989.18(a). The Air Force's May 18,

2005 NOI falls far short of satisfying NEPA. Accordingly, we urge the Air Force to publish a revised NOI providing adequate information about the nature of its proposal.¹

The Air Force's NOI also fails to describe any alternatives to its proposed action. The notice merely states that "[t]he [Draft Programmatic Environmental Impact Statement] will analyze and evaluate the impacts of alternatives" and requests public comments on "reasonable alternatives that should be considered." 70 Fed. Reg. 28,517. Such a request suggests that the Air Force is relying solely on the public to identify reasonable alternatives to the proposed action. This exclusive reliance on the public is not only unreasonable considering the NOI's inadequate description of the proposed action, but also violates the Council of Environmental Quality's ("CEQ") requirement that an NOI "[d]escribe the proposed action and possible alternatives." 40 C.F.R. § 1508.22 (emphasis added).

The alternatives analysis is the heart of the NEPA process. See 40 C.F.R. § 1502.14. Only by putting on the table, for its own and the public's view, a sufficiently detailed analysis of the environmental consequences of its proposed action and of alternatives that might be pursued with less environmental harm can the Air Force satisfy Congress's command to make a fully informed choice between the various options.

Even without adequate detail regarding the Air Force's proposal, the limited information in the NOI makes clear that the proposed basing of a GSTF at Andersen would adversely affect native forest habitat essential to the continued survival and eventual recovery of three critically endangered species native to Guam - the Mariana crow, the Mariana fruit bat, and the Guam Micronesian kingfisher. See 67 Fed. Reg. 63,738, 63,747-49, 63,757-59, 63,761-63, 63,769-71 (Oct. 15, 2002).² The widespread construction and renovation projects associated with basing a GSTF at Andersen AFB will inevitably remove, thin, destroy, and/or fragment essential forest habitat, threatening these species' continued survival and future recovery. See 69 Fed. Reg. at 62,952 (describing activities likely to adversely modify essential recovery habitat or jeopardize Guam's endangered species); 67 Fed. Reg. at 63,750 (same). Moreover, it is highly likely these species will be disturbed by the influx of aircraft noise associated with the Air Force's proposal to base and rotate additional aircraft to Andersen AFB. See 69 Fed. Reg. at 62,961 (noting that a study on the effect of aircraft overflights "suggest[s] that noise or visual disturbance in proximity

¹ Since many interested parties, including Earthjustice, were unable to attend the scoping meeting, merely providing the missing information at that meeting would not satisfy the Air Force's legal obligations. We do request, however, that you mail us any information provided at the scoping meeting (including, but not limited to, copies of any written materials distributed and print-outs of any Powerpoint presentations), as well as any additional information that would flesh out what the Air Force proposes to do at Andersen AFB.

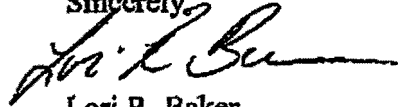
² While the U.S. Fish and Wildlife Service ultimately excluded Andersen AFB from the final critical habitat designation for these three species, the Service did so solely on the ground that the installation's Integrated Natural Resource Management Plan provides benefits to these species. 69 Fed. Reg. 62,944, 62,953 (Oct. 28, 2004). The final designation made clear that the forest habitat at Andersen AFB is still considered essential to these three species' survival and recovery. Id. at 62,974-75.

to a crow nest or fruit bat colony may disturb the animals and cause them to leave nests or roost sites").

In its EIS, the Air Force must take a hard look at the potentially disastrous direct, indirect and cumulative impacts on endangered species and essential recovery habitat of pursuing a GSTF at Andersen AFB. Moreover, the Air Force must seriously consider locations other than Guam where a GSTF might be stationed with less environmental harm.

We appreciate the opportunity to provide these initial scoping comments and look forward to providing additional comments after we receive adequate information about the Air Force's proposal. In the meantime, please feel free to contact me should you wish to discuss the foregoing.

Sincerely,

A handwritten signature in black ink, appearing to read "Lori R. Baker", written over a horizontal line.

Lori R. Baker
Summer Associate



Department
of Agriculture
STATE OF HAWAII

1428 So. King Street
Honolulu, Hawaii 96814-2512

FAX TRANSMITTAL

Date: 6/29/05To: Scott WhittakerCompany or
Department:From: Sandra Lee KuhnimotoDivision/Branch: DOAFAX No.: (671) 366-5088FAX No.: (808) 973-9613

Subject: _____

Remarks:

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Honolulu, Hawaii 96814-2512

SANDRA LEE KUNIMOTO
Chairperson, Board of Agriculture

DUANE K. OKAMOTO
Deputy to the Chairperson

June 29, 2005

Mr. Scott Whittaker
Environmental Flight Chief, Unit 14007
APO AP 96543-4007

Dear Mr. Whittaker:

Thank you for the opportunity to comment on the "Notice of Intent to Prepare a Draft Programmatic Environmental Impact Statement for Basing a Global Strike Task Force, Andersen Air Force Base, Guam (U.S. Territory)" (DPEIS). This was noticed in the Federal Register, Vol. 70, No. 95, p. 28517.

Hawaii is concerned with the impact that increased military activities on Guam will have on the State of Hawaii. The impact to Hawaii of this proposed expansion and the cumulative effects of current and future expansions of the Air Force and Navy on Guam need to be considered in the DPEIS.

Current military activities on Guam have increased the risk of accidental importation to Hawaii of brown treesnake and other alien species. Brown treesnakes have been intercepted eight times in Hawaii in association with the movement of military aircraft, equipment, supplies, empty containers and household goods of military personnel. An increase in military movement will increase the risks for the movement of these pests to Hawaii. This needs to be addressed in the DPEIS.

The brown treesnake was likely introduced to the island of Guam in materials moved by the military during the late 1940's. The snake has caused, and continues to cause, significant economic, ecological, and human health impacts to Guam. The brown treesnake is responsible for the extinction of 9 of 13 native forest bird species on Guam. The brown treesnake causes frequent electrical power outages and is a concern for human health and safety. Snakes currently occur at high densities on Guam and there is a significant risk that these snakes will be transported off Guam in military transport and cargo.



Mr. Scott Whittaker
June 29, 2005
Page 2

Similar impacts would be experienced in Hawaii should the snake become established here. Experts estimate the potential economic impact to Hawaii would be between \$400 million and \$1.8 billion annually.

Hawaii would like to see 100% inspection of military vehicles and household goods, as well as 100% coverage by an interdiction program at sea ports and airports.

Thank you for your consideration of these issues in your DPEIS.

Sincerely,

A handwritten signature in black ink, appearing to read "Sandra Lee Kunimoto", written over a horizontal line.

Sandra Lee Kunimoto, Chairperson
Board of Agriculture

**PUBLIC INVOLVEMENT
PUBLIC HEARING**



DEPARTMENT OF THE AIR FORCE
36th CIVIL ENGINEER SQUADRON (PACAF)
UNIT 14007, APO AP 96543-4007

April 26, 2006


MEMORANDUM FOR SEE DISTRIBUTION

FROM: 36th Civil Engineer Squadron
Environmental Flight
Andersen Air Force Base
APO. AP 96543-4007

SUBJECT: Draft Environmental Impact Statement, Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike (ISR/Strike) Capability at Andersen Air Force Base, Guam

1. The Air Force has prepared a Draft Environmental Impact Statement (EIS) for the establishment and operation of the ISR/Strike capability that could add as many as 3,000 military, civilian, and contractor personnel and dependents at Andersen AFB. Facility construction, addition, and alteration projects would be required to support the ISR/Strike initiative. Construction would begin in 2007 and would be completed by 2016, with recurring operations continuing thereafter. The EIS provides details of the action, explains the purpose and need for the action, and assesses the potential impacts of the Proposed Action and No Action Alternative.
2. **Privacy Advisory:** Your comments on this draft EIS are requested. Letters or other written or oral comments provided may be published in the final EIS. As required by law, comments will be addressed in the final EIS and made available to the public. Any personal information provided will be kept confidential. Private addresses will be compiled to develop a mailing list for those requesting copies of the final EIS. However, only names of the individuals making comments and specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the final EIS.
3. Written comments must be postmarked by June 19, 2006 to be considered in the final EIS. Responses should come directly to: 36 CES/CEV, Unit 14007, APO, AP 96543-4007.
4. Questions can be directed to Mr. Jonathan Wald, 36 CES/CEV, (671) 366-2549.

Sincerely,


SCOTT WHITTAKER, GS-13
Chief, Environmental Flight

Distribution List
Draft Environmental Impact Statement, Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability at Andersen Air Force Base, Guam

Agencies	Individuals
Dr. C. Lynn Raulerson, Tropical Ecologist and Botanist University of Guam 303 University Station University Drive Mangilao, Guam 96929	The Honorable Adolpho B. Palacios, Sr. Guam Senator P.O. Box 24433 Barrigada Guam 96921
Lynda B. Aguon, Guam Historic Preservation Officer Department of Parks and Recreation Guam Historic Resources Division 490 Chalan Palasyo Agana Heights, Guam 96910	Mr. Mike Cruz Alberto A.C. Lamorena, Acting Administrator Guam Economic Development and Commerce Authority 590 S. Marine Drive Tamuning, Guam 96913
Ms. Evangeline Lujan Bureau of Statistics and Plans Guam Coastal Management Program P.O. Box 1950 Hagatna, Guam 96932	Mr. David Lane Henkin, Staff Attorney Earthjustice 223 S. King Street Suite 400 Honolulu, HI 96813-4501
Paul C. Bassler, Director Department of Agriculture Division of Aquatic and Wildlife Resources 142 Dairy Road Mangilao, Guam 96913	Mr. Dylan Kesler 4845 S.E. 3rd Street Corvallis, OR 97333
Mr. Chris Bandy, Project Leader U.S. Fish and Wildlife Service Guam National Wildlife Refuge P.O. Box 8134, MOU-3 Dededo, Guam 96929	Dr. Justine B. de Cruz 5 Osgood Avenue New Britain, CT 06053
Mr. Gerald S.A. Perez, Administrator Guam Economic Development Authority ITC Building, Suite 511 590 S. Marine Drive Tamuning, Guam 96913	Mr. David Fischer American Bird Conservancy 1731 Connecticut Avenue, NW, 3rd Floor Washington, DC 20009
Mr. Celestino "Tino" F. Aguon Department of Agriculture Division of Aquatic and Wildlife Resources 162 Dairy Road Mangilao, Guam 96923	Mr. Jeffrey R. Walters, Bailey Professor of Biology Virginia Polytechnic Institute and State University Department of Biology College of Arts and Sciences Blacksburg, VA 24061-0406
Mr. Patrick Leonard, Field Supervisor U.S. Fish and Wildlife Service Pacific Islands Fish and Wildlife 300 Ala Moana Blvd., Room 3-122, Box 50088 Honolulu, Hawaii 96850	Ms. Gretchen R. Grimm, President Marianas Audubon Society P.O. Box 4425 Hagatna, Guam 96932
Commonwealth of the Northern Mariana Islands Department of Lands and Natural Resources Division of Fish and Wildlife P.O. Box 10007 Saipan, MP 96950	Mr. L. Carl Peterson, CFP Money Resources, Inc. 415 Chalan San Antonio #210 Tamuning, Guam 96913
Guam Waterworks Authority P.O. Box 3010 Hagatna, GU 96932	Ms. Marjorie Ziegler Conservation Council for Hawaii P.O. Box 2923 Honolulu, HI 96802

Agencies	Individuals
<p>Guam Department of Public Works 542 North Marine Corps Drive, Tamuning, GU 96913</p>	<p>Nieves Flores Memorial Library 254 Martyr St. Hagatna, Guam 96910</p>
<p>Guam Power Authority P.O.2977, Hagatna, GU 96932</p>	<p>Ms. Sandra Lee Kunimoto, Chairperson, Board of Agriculture State of Hawaii Department of Agriculture 1428 S. King Street Honolulu, HI 96814-2512</p>
<p>Mr. Richard Seman, Secretary Commonwealth of the Northern Mariana Islands Department of Lands and Natural Resources Lower Base P.O. Box 10007 Saipan, Mariana Islands 96950</p>	<p>Mr. James Pigg 4851 Quail Run Las Cruces, NM 88011</p>
<p>Mr. Randy Sablan, Acting Administrator Guam EPA P.O. Box 22439 GMF Barrigada, Guam 96921</p>	
<p>Ms. Sandra Lee Kunimoto, Chairperson, Board of Agriculture State of Hawaii Department of Agriculture 1425 South King Street Honolulu, Hawaii 96814-2512</p>	
<p>Mr. Mark Kaminski/ Jeffrey Yamamoto COMPACFLT 250 Makalapa Dr, Pearl Harbor, HI 96860-3131</p>	
<p>Mr. Donald R. Schregardus, Deputy Assistant Secretary Department of the Navy Office of the Assistant Secretary Installations and Environment 1000 Navy Pentagon Washington, D.C. 20350-1000</p>	
<p>Mr. Anthony Hoover OMNAVREG MARIANAS No. 42 B-105 Upper Level NAVFAC Marianas Complex Naval Base Santa Rita, Guam 96915</p>	
<p>Karen Vitulano US EPA - Region IX Federal Activities Office Cross Media Division 75 Hawthorne Street San Francisco, CA 94105</p>	

Visceral fat: Higher rate of heart attacks and death

▲ Continued from Page 26

with those who hadn't. But heart attack sufferers had a much higher waist-to-hip ratio (a measurement that reflects abdominal fat) compared with those who hadn't, regardless of other cardiovascular risk factors. This finding was true for men and women in every ethnic group.

"This was the first study that really documented this relationship

across all ethnic groups," says Dr. Arya M. Sharma, a co-author of the study from McMaster University in Hamilton, Ontario, Canada, and director of the Canadian Obesity Network.

Other studies have linked visceral fat to metabolic syndrome — a grouping of risk factors, such as high cholesterol and high blood pressure, that can precede diabetes and heart disease. For example, Wake Forest University researcher

Barbara Nicklas published a study in 2004 showing that among overweight, post-menopausal women, those with the most abdominal fat were the most likely to have metabolic syndrome.

Additional illnesses may be influenced by excess abdominal weight too. A Kaiser Permanente study presented earlier this year at an obesity conference showed that people with the most abdominal fat were 145 percent more likely to de-

velop dementia compared with people with the least amount of abdominal fat.

Research has also linked deep abdominal fat to the development of gallstones and breast cancer in women and overall risk of premature death in men. In a study of 291 men published online earlier this month in the journal *Obesity Research*, doctors found that men with more abdominal fat died in greater numbers, independent of all other risk factors

the scientists examined. A man with 2.2 pounds of visceral fat has double the risk of death compared with a man with 1.1 pounds of fat.

Visceral fat may be worse than fat in the hips or buttocks not just because of the substances it makes — but because of its location. It sits near the portal vein, a major vessel that carries blood from the abdominal organs. "Visceral fat dumps its products into this vein that goes right into the liver," Bergman said.

NOTICE OF AVAILABILITY AND PUBLIC HEARING DRAFT ENVIRONMENTAL IMPACT STATEMENT PROPOSED ESTABLISHMENT AND OPERATION OF AN INTELLIGENCE SURVEILLANCE, RECONNAISSANCE, AND STRIKE CAPABILITY AT ANDERSEN AIR FORCE BASE, GUAM



To support National and regional security in the Pacific, Headquarters Pacific Air Forces is proposing to establish an intelligence, surveillance, reconnaissance, and strike (ISR/Strike) capability at Andersen AFB. This action was formerly known as the Global Strike Task Force. The ISR/Strike capability would be used to achieve pre-engagement battle space awareness, locate and identify critical adversary moves, achieve assured success through air dominance, and deliver decisive effects via persistent and precise application of air and space power. Establishing the ISR/Strike capability would add as many as 3,000 military, civilian, and contractor personnel and dependents at Andersen AFB. Numerous facility construction, addition, and alteration projects would be accomplished to support the ISR/Strike capability. Activities would begin in 2007 with construction projects and would be completed by 2016, with recurring operations continuing after that date.

The Air Force has prepared a Draft Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA) of 1969. The Draft EIS evaluates the potential environmental impacts that may result from the implementation of alternative actions and the No Action Alternative, as well as possible cumulative impacts from other past, present, and reasonably foreseeable future actions.

The Draft EIS is available for review at the Nieves Flores Memorial Library, 254 Martyr St., Hagatna, Guam 96910, online at <http://www.nepa-andersen-public-comment.com/>, or by request from Mr. Scott Whittaker (see below). Public comments on the Draft EIS are requested. Comments must be postmarked no later than June 27, 2006 to be considered in the Final EIS which is planned to be available to the public in August 2006. The public is invited to attend a public hearing at 6:00 p.m. on Thursday, June 1, 2006 at the Hilton Guam to obtain information and provide input on the findings of the Draft EIS.

If you are unable to attend this public hearing and/or wish to submit written comments, or need further information, please contact: Mr. Scott Whittaker, Environmental Flight Chief, Unit 14007, APO AP 96543-4007 Telephone: (671) 366-2101, Facsimile: (671) 366-5088.

All written comments must be postmarked no later than June 27, 2006. Email correspondence will not be accepted.

Scientists move away from measuring BMI

By Shari Roan

Los Angeles Times

Scientists are changing their minds about the best way to monitor body fat. Body mass index, or BMI — long considered the gold standard for evaluating an increased risk of health problems due to weight — is far from a perfect measure, says Dr. Arya M. Sharma, an obesity researcher at McMaster University in Hamilton, Ontario, Canada.

The BMI doesn't take into account the amount of muscle a person has, and is less accurate in older people, who lose muscle and bone and gain fat with age. It is also less accurate in certain ethnic groups, such as Asians, because their body fat percentage at various BMIs differs from that of Caucasians.

It also doesn't measure visceral fat, which may be more significant to overall health than knowing one's BMI.

The best way to measure visceral

whose BMI is considered normal can have an unhealthy waist circumference.

To assess abdominal fat, measure either your waist or your hip-to-waist ratio.

▲ **Waist:** Measure your waist at its narrowest point as viewed from the front. That's usually at the belly button for normal-weight people. If you're overweight, measure at the point of the elbow when your arms are at your sides. Pull the tape measure snug — no slack in the tape — but not so tight that it's compressing your skin. Keep the tape measure parallel to the floor.

For white, black and Hispanic men, 40 inches or more denotes a heightened risk of health problems related to abdominal obesity. For Asian men, it's greater than 37 inches.

For white, black and Hispanic women, 35 inches or more denotes a heightened risk of health problems related to abdominal obesity. For Asian women, it's greater than 31 inches.

Pacific Daily News
GUAM'S *complete* SOURCE

238 Archbishop Flores Street
Hagatna, Guam 96910

DATE May 31, 2006

CERTIFICATE OF PUBLICATION

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The undersigned hereby certifies that the below DESCRIBED legal Notice, Proof of Publication of which is herewith enclosed and attached thereto, was published in the **PACIFIC DAILY NEWS/SUNDAY NEWS** on the following days:

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Pacific Daily News



Frances C. Quitugua
National , Major Account Executive

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Tearsheets attached.

GUAM PUBLICATIONS INCORPORATED

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 ENVIRONMENTAL PROTECTION AGENCY
 [ER-FRL-6675-1]

Environmental Impacts Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General
 Information (202) 564-7167 or <http://www.epa.gov/compliance/nepa/>.

Weekly receipt of Environmental Impact Statements

Filed May 1, 2006 through May 5, 2006

Pursuant to 40 CFR 1506.9.

EIS No. 20060170, Draft EIS, COE, AZ, Rio Salado Oeste Project, Ecosystem Restoration along the Salt River, City of Phoenix, Maricopa County, AZ, Comment Period Ends: June 26, 2006, Contact: Scott K. Estergard 602-640-2001.

EIS No. 20060171, Draft EIS, COE, KY, Levisa Fork Basin Project, Section 202 Flood Damage Reduction, Big Sandy River, Floyd County, KY, Comment Period Ends: June 26, 2006, Contact: Stephen O'Leary 304-35841.

EIS No. 20060172, Final EIS, AFS, 00, Grizzly Bear Conservation for Greater Yellowstone Area National Forests, Implementation, Amend Forest Plans: Beaverhead-Deerlodge National Forest, Bridger-Teton National Forest, Caribou-Targhee National Forest, Custer National Forest, Gallatin National Forest and Shoshone National Forest, MT, and ID, Wait Period Ends: June 12, 2006, Contact: Susie Douglas 307-578-1214.

EIS No. 20060173, Draft EIS, UAF, GU, Andersen Air Force Base (AFC) Establish and Operate an Intelligence, Surveillance, Reconnaissance and Strike (ISR/Strike) Capability, Guam, Comment Period Ends: June 2006, Contact: Scott Whittaker 671-366-2101.

EIS No. 20060174, Final Supplement, AFS, WY, Dean Project Area, Proposes to Implement Multiple Resource Management Actions, New Information to Disclose Direct, Indirect, and Cumulative Environmental Impacts, Black Hills National Forest, Bearlodge Ranger District, Sundance, Crook County, WY, Wait Period Ends: June 12, 2006, Contact: Steve Kozel 307-283-1361.

EIS No. 20060175, Final EIS, FRC, LA, Creole Trail Liquefied Natural Gas

Gas (LNG) Terminal and Pipeline Project, Construction and Operation, Cameron, Calcasieu, Beauregard, Allen, Jefferson, Davis and Acadia Parishes, LA, Wait Period Ends: June 12, 2006, Contact: Todd Sedma 866-208-3372.

EIS No. 20060176, Final EIS, FRC, TX, Port Arthur Liquefied Natural Gas (LNG) Project, Construction and Operation, U.S. Army COE Section 1404 Permits, (FERC/EIS-0182D), Jefferson and Orange Counties TX and Cameron, Calcasieu and Beauregard Parishes, LA, Wait Period Ends: June 12, 2006, Contact: Thomas Russo 1-866-208-FERC.

EIS No. 20060177, Draft EIS, IBR, CA, Contra Costa Water District Alternative Intake Project, To Protect and Improve the Quality of Water Delivered to Untreated and Treated-Water Customers, Contra Costa County, CA, Comment Period Ends: June 26, 2006, Contact: Erika Kegel 916-950-5081.

Dated: May 9, 2006.
Robert W. Hargrove,
Director, NEPA Compliance Division, Office of Federal Activities.
[FR Doc. E6-7266 Filed 5-11-06; 8:45 am]

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Last updated on Friday, May 12th, 2006
URL: <http://www.epa.gov/fedrgstr/EPA-IMPACT/2006/May/Day-12/i7266.htm>

PARSONS

PUBLIC HEARING SUMMARY, Draft EIS: ISR/Strike Capability, Andersen AFB, Guam, 1 June 2006

8 June 2006

A Public Hearing was held on 1 June 2006 for the Draft Environmental Impact Statement (EIS) for the proposed Intelligence, Surveillance and Reconnaissance (ISR)/Strike Capability at Andersen Air Force Base (AFB), Guam. On 31 May 2006, Parsons staff met with Air Force personnel to rehearse the public hearing. These activities are summarized herein.

This is a preliminary summary based on observations of the Public Hearing. A written transcript of the proceedings will be provided at a later date.

I. Public Hearing Rehearsal, 31 May 2006

A meeting with 36 CES/CEV and other team members was held on Wednesday, 31 May 2006 at Andersen AFB to prepare for the ISR/Strike Public Hearing. Attendees are shown on Table 1.

Table 1. Rehearsal Participants

Name	Affiliation
Col Wilfred Cassidy	36 MSG/CC
Lt Col John Hartsell	HQ AF/JAT
Lt Col Rowene Lant	HQ PACAF/A7N
Lt Jennifer Espinoza	36 CES/CEVP
Jezzica Camacho	36 CES/CEVC
Jon Ostil	PACAF/A7NA
Elvira Gaddi	Parsons
Taylor Houston	Parsons

The slides and script were reviewed and final revisions were made. The Moderator reviewed the public session format with regard to responding to questions and comments.

II. ISR/Strike Capability Public Hearing, 1 June 2006 (1600 to 1900 hrs)

The ISR/Strike Draft EIS Public Hearing was held at 1600 hrs to 1900 hrs on Thursday, 1 June 2006 in The Gallery of the Hilton Guam in Agana, Guam. The Gallery was set up with theatre-style seating for 75, a large pull-down screen and podium at the front of the room, and easels with story boards along the back and side of the room. The registration table was set up with sign-in sheets, speaker cards, written comment sheets, and agendas. Refreshments and snacks were served at the back of the room. The meeting doors opened at 1600 hours with registration, informal discussions and viewing of poster boards.

A total of 39 persons attended the public hearing: 13 agency representatives, three elected officials from the Guam Legislature, three from organizations, eight community members and 12 Air Force and associated contractors (see Table 2 and attached sign-in sheets).

Table 2. Public Hearing Attendees

Type	Description		Number of Attendees	Subtotal
Government Agencies	Federal	FAA	1	3
		USFWS	1	
		Navy	1	
	GovGuam	GDAWR/Agriculture	6	10
		GEPA	1	
		Port Authority	1	
		Bureau of Statistics and Planning/Coastal Resources Management Program	2	
Guam Legislature			3	3
Organizations	Chamoru Cultural Development and Research Institute		1	3
	Intergraph		2	
Community Members			8	8
USAF and Parsons			12	12
TOTAL				39

At approximately 1800 hrs, the Hearing Officer (Lt Col Hartsell) welcomed the attendees and provided opening statements. Col Wilfred Cassidy, 36 MSG/CC, gave welcoming remarks and provided information on the mission of Andersen AFB. This was followed by project information by Lt Col Lant, and Lt Jennifer Espinoza.

Lt Col Hartsell then opened the meeting to public comments. Three speakers provided oral testimony:

- **Mr. Antonio Sablan** indicated his concern regarding the safety of the people of Guam with regards to military buildup on Guam and that his family was not duly compensated for land condemnation by U.S. government in the acquisition of Andersen AFB lands.
- **Senator Joanne M.S. Brown (Guam Legislature)** provided comments in favor of the project and appreciation for reuse of developed land on Andersen AFB for the project to the maximum extent possible.
- **Mr. Cole Herndon** made comments regarding preservation of cultural resources.

Two written comment sheets were received at the public hearing: (1) Mr. Adolpho Palacios provided comments in favor of the project; and, (2) Mr. Cole Herndon suggested that construction projects be monitored for cultural resources.

The public hearing was adjourned at approximately 1930 hrs with no further questions or comments. The group proceeded to break out into smaller discussions near the poster boards. A representative from the Chamorro Nation arrived after the meeting concluded, and was provided with meeting materials and a CD of the Draft EIS.

Parsons and 36 CES/CEV representatives remained in the meeting room until 2000 hrs for any other latecomers, and then closed down.

Attchs: public hearing sign-in sheets, speaker cards and written comment sheets

PUBLIC HEARING

ENVIRONMENTAL IMPACT ANALYSIS PROCESS FOR ISR/STRIKE TASK FORCE AT ANDERSEN AIR FORCE BASE
Thursday, June 1, 2006 6:00 p.m. Hilton Guam Tamuning, Guam

SIGN-IN SHEET

Name	Affiliation	Complete Mailing Address	Phone No. and/or Email (Optional)
1. Carl Quinata	Guam Legislature		
2. Gregg Ikeham	AAFB		
3. Kris Meyle	AAFB		
4. Ken Patterson	Intergraph		
5. MALCOLM WORSHAM	FAT		
6. Ed Aranza	GEPA		
7. AMENA F. DE LEON	BSP/GCMP		
8. JOHN HLAWRENCE	SELF		
9. JEFFREY QUTUBA	GDAWR		
10. Joanne McS. Brown	Guam Legislature		
11. Adolpho B. Palacios	Guam Legislature		
12. Anthony Hoover	CNRM		
13. Paxton, Julie	REALTOR®		
14. A. A. SABLON	Citizen		

PUBLIC HEARING

ENVIRONMENTAL IMPACT ANALYSIS PROCESS FOR ISR/STRIKE TASK FORCE AT ANDERSEN AIR FORCE BASE
Thursday, June 1, 2006 6:00 p.m. Hilton Guam Tamuning, Guam

SIGN-IN SHEET

Name	Affiliation	Complete Mailing Address	Phone No. and/or Email (Optional)
1. Celestino Aguan	Agriculture		
2. Matt Brown	USFWS		
3. Brown, Tony	Intergraph		
4. Merly Aranza			
5. Francis L. G. Danna	BSP		
6. Nirmala Dangel	Agriculture		
7. Diane Vice	Agriculture		
8. Jess Torres	NONE		
9. Jay Gutierrez	Agriculture		
10. Joe Mesa	Port		
11. Patria U. Sablan	none		
12. P. Sablan	NONE	N/A	
13. Shianne Medina	Agriculture		
14. Trini Torres	Chamorro Cultural Development and Research Institute / Chamorro Nation		

PUBLIC HEARING

ENVIRONMENTAL IMPACT ANALYSIS PROCESS FOR ISR/STRIKE TASK FORCE AT ANDERSEN AIR FORCE BASE
Thursday, June 1, 2006 6:00 p.m. Hilton Guam Tamuning, Guam

SIGN-IN SHEET

	<u>Name</u>	<u>Affiliation</u>	<u>Complete Mailing Address</u>	<u>Phone No. and/or Email (Optional)</u>
1.	John Hill	AFCEE		
2.	Cole Herndon			
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				

PUBLIC HEARING

ENVIRONMENTAL IMPACT ANALYSIS PROCESS FOR ISR/STRIKE TASK FORCE AT ANDERSEN AIR FORCE BASE
Thursday, June 1, 2006 6:00 p.m. Hilton Guam Tamuning, Guam

SIGN-IN SHEET

<u>Name</u>	<u>Affiliation</u>	<u>Complete Mailing Address</u>	<u>Phone No. and/or Email (Optional)</u>
1. Lt Col Marvin Smith		36 CES/CC	
2. Lt Col Rowene Lant		HQ PACAF/A7N	
3. Lt Jennifer Espinoza		36 CES/CEV	
4. Col Wilfred Cassidy		36 MSG/CC	
6. Lt Col John Hartsell		HQ AF/JAT	
6. Jon Ostil			
7. Taylor Hoosten			
8. Elvira Gaddi			
9. Jezzica Camacho			
10.			
11.			
12.			
13.			
14.			

SPEAKER REQUEST CARD
PUBLIC HEARING
ENVIRONMENTAL IMPACT ANALYSIS PROCESS
ISR/STRIKE TASK FORCE
ANDERSEN AIR FORCE BASE, GUAM
JUNE 1, 2006

☒ **YES**, I WISH TO MAKE A VERBAL COMMENT AT TONIGHT'S PUBLIC HEARING.
The subject of my comment is _____

Name (please print): ANTONIO SABLON

Affiliation: SELF-CITIZEN

Mailing Address: _____

City, State, Zip: _____

PLEASE GIVE THIS CARD TO A STAFF MEMBER. THANK YOU.

SPEAKER REQUEST CARD
PUBLIC HEARING
ENVIRONMENTAL IMPACT ANALYSIS PROCESS
ISR/STRIKE TASK FORCE
ANDERSEN AIR FORCE BASE, GUAM
JUNE 1, 2006

☒ **YES**, I WISH TO MAKE A VERBAL COMMENT AT TONIGHT'S PUBLIC HEARING.
The subject of my comment is _____

Name (please print): Joanne M-S Brown

Affiliation: Guam Legislature

Mailing Address: _____

City, State, Zip: _____

PLEASE GIVE THIS CARD TO A STAFF MEMBER. THANK YOU.

SPEAKER REQUEST CARD
PUBLIC HEARING
ENVIRONMENTAL IMPACT ANALYSIS PROCESS
ISR/STRIKE TASK FORCE
ANDERSEN AIR FORCE BASE, GUAM
JUNE 1, 2006

☒ **YES**, I WISH TO MAKE A VERBAL COMMENT AT TONIGHT'S PUBLIC HEARING.
The subject of my comment is _____

Name (please print): Cole Heardon

Affiliation: _____

Mailing Address: _____

City, State, Zip: _____

PLEASE GIVE THIS CARD TO A STAFF MEMBER. THANK YOU.



WRITTEN COMMENT SHEET

DRAFT ENVIRONMENTAL IMPACT STATEMENT:
PROPOSED ISR/STRIKE TASK FORCE ON
ANDERSEN AIR FORCE BASE, GUAM

Thank you for attending this public hearing. Our purpose for hosting this meeting is to give you an opportunity to comment on the findings of the Draft Environmental Impact Statement (EIS). Please use this sheet to bring to our attention potential environmental issues that you feel should be considered by the Air Force. You may use the back of this sheet if necessary.

Please print your comments below:

Date: 6-7-06

The presentation tonight reflects care & sensitivity to the local youth & local people continue to do this.
We need to proceed to complete this project to strengthen our country's capability to deter aggression, & to prevent in conflict, should conflict be imposed upon our country.
God bless America!

Your Name (please print): Adolpho Palacios

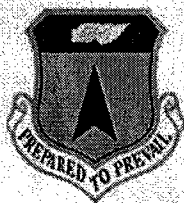
Affiliation: Member, 28th Guam Legislature

Street Address: Guam Legislature

City, State, Zip: Agaña, GU

Phone and/or Fax Number (optional):

email (optional):



Please hand this form in tonight, or mail it to:

Mr. Jonathan Wald, Chief of Environmental Planning
36 CES/CEV
Unit 14007
APO AP 96543-4007

Your letter must be postmarked by June 27, 2006
to ensure consideration in the Final EIS.



WRITTEN COMMENT SHEET

DRAFT ENVIRONMENTAL IMPACT STATEMENT:
PROPOSED ISR/STRIKE TASK FORCE ON
ANDERSEN AIR FORCE BASE, GUAM

Thank you for attending this public hearing. Our purpose for hosting this meeting is to give you an opportunity to comment on the findings of the Draft Environmental Impact Statement (EIS). Please use this sheet to bring to our attention potential environmental issues that you feel should be considered by the Air Force. You may use the back of this sheet if necessary.

Please print your comments below:

Date: June 1, 2006

Since cultural resources is an integral part of a complete Environmental Impact Study, my suggestion is to make sure that any construction project is monitored by a cultural resource manager. Areas of concern include but not limited to: (a) WWII history (Last mission, artifacts, etc.) (b) ancient Chamorro History/sites/artifacts (c) Spanish period artifacts

Your Name (please print): Cole Herndon

Affiliation: _____

Street Address: _____

City, State, Zip: _____

Phone and/or Fax Number (optional): _____

email (optional): _____



Please hand this form in tonight, or mail it to:

Mr. Jonathan Wald, Chief of Environmental Planning
36 CES/CEV
Unit 14007
APO AP 96543-4007

Your letter must be postmarked by **June 27, 2006**
to ensure consideration in the Final EIS.

PACIFIC AIR FORCES

PUBLIC HEARING

**Draft EIS
ISR/Strike Capability
Andersen AFB, Guam**

May 25, 2006

COPY

PREPARED BY:

GEORGE B. CASTRO

DEPO RESOURCES

#49 Anacoco Lane, Nimitz Hill Estates

Piti, Guam 96915

Tel: (671)688-DEPO * Fax: (671)472-3094

PACIFIC AIR FORCES

PUBLIC HEARING

Public hearing for the environmental impact statement (EIS) of the proposed establishment of an intelligence, surveillance, reconnaissance and strike capability at Andersen Air Force Base, Guam, was taken on Thursday, June 1, 2006 at the hour of 6:12 p.m., at the Gallery Room, Guam Hilton Hotel, 202 Hilton Road, Tamuning, Guam, before George B. Castro of Depo Resources. That at said time and place there transpired the following:

APPEARANCES

Lt. Colonel John E. Hartsell	United States Air Force Judiciary, Washington, D.C.
Colonel Wilfred Cassidy	Commander, Mission Support Group, AAFB
Lt. Col. Rowene Lant	Chief, Environmental Integration Branch, Headquarters Pacific Air Forces, Hawaii
Lt. Jennifer Espinoza	Environment Planning section, AAFB
Lt. Col. Marvin Smith	Civil Engineer, 36 th Wing, AAFB
Lt. John Griffin	Public Affairs Officer
Ms. Elvira Gaddi	Private Consulting Firm (assisting the Air Force)
Mr. Taylor Houston	Private Consulting Firm (assisting the Air Force)

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George B. Castro

COURT REPORTER

Tel.: (671)688-DEPO * Fax: (671)472-3094

PUBLIC TESTIMONY

Mr. Antonio Sablan Page 28

Senator Joanne M.S. Brown Page 30

Mr. Cole Herndon Page 33

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George B. Castro

COURT REPORTER

Tel.: (671)688-DEPO * Fax: (671)472-3094

1 **TAMUNING, GUAM, THURSDAY, JUNE 1, 2006: 6:12 P.M.**

2
3 LT. COL. HARTSELL: This hearing is
4 called to order. Good evening. My name is Lt.
5 Colonel John E. Hartsell. And I'm from the
6 United States Air Force Judiciary in
7 Washington, D.C. Welcome to tonight's public
8 hearing.

9 This is a public hearing for the
10 environmental impact statement of the proposed
11 establishment of an intelligence, surveillance,
12 reconnaissance and strike capability at
13 Andersen Air Force Base, Guam.

14 The time is now 6:12 p.m., Thursday,
15 the 1st of June, 2006. We're in the gallery
16 room, located at the Hilton Guam, 202 Hilton
17 Road, Tamuning, Guam.

18 Notice of the public hearing was
19 published in the Pacific Daily News on May 12th,
20 14th, and 30th, 2006. It was also published on
21 the 12th of May 2006 in the federal register.

22 Also, this meeting is being transcribed
23 by a court reporter. So a word-for-word record
24 of this hearing will become part of the
25 administrative record for this project. A

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1 summary of the transcript will be available at
2 the Andersen Air Force Base Public Affairs
3 Office and the Nieves Flores Public Library in
4 Hagatna.

5 Thank you for taking the time to come
6 here tonight. I am the hearing magistral.

7 I'd like to make clear from outset that
8 I'm hear in my capacity as a federal judge
9 solely to act as a moderator for this hearing.
10 When the hearing is over, I do not make any
11 decisions or recommendations about the EIS.

12 Before we begin, let me make a few
13 administrative remarks. The restrooms are
14 located in the hallway out the door
15 (indicating).

16 And so that everyone can hear what is
17 being said, and so that the transcript comes
18 out clear and we get a verbatim transcript at
19 the conclusion of this hearing, please refrain
20 from talking loudly amongst yourselves so that
21 we can hear everyone talking and get a good,
22 clear transcript and everyone else can hear
23 what everyone else is saying.

24 In addition to that, please turn off
25 all cell phones, the sound function on it, so

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1 that we're not interrupted during the course of
2 this hearing.

3 And if you haven't already done so,
4 there are sign-in sheets at the front door.
5 Please sign in your name. Please write
6 legibly.

7 And finally, in case of an emergency,
8 there is a door at the back of this room, and
9 if exit is necessary, follow the green exit
10 signs in an orderly fashion out of the
11 building.

12 Our public hearing tonight will be
13 organized in the following manner:

14 After my remarks, I will introduce
15 members of the project team. Project team
16 members from Andersen Air Force Base and
17 Pacific Air Forces will provide an overview of
18 the project and planning activities now
19 ongoing.

20 Following this, I will again provide
21 instructions for those of you who wish to make
22 written or verbal statements about this
23 proposed project.

24 Just briefly before we go on, those of
25 you who only want to make a written statement

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1 can go to the back of the room, where comment
2 forms and pens have been placed on the tables.

3 If you want to write your comment while
4 you are at your seat and you need a pen or a
5 form, just raise your hand and someone will get
6 a comment sheet for you. The comment sheets
7 are yellow documents. They are a 1-page
8 document and at the top of the document is
9 written, Written Comment Sheet. So, if you
10 raise your hand if want one of these, someone
11 will bring you this (indicating) and a pen as
12 well.

13 Please leave your written comment sheet
14 with one of the staff or send comments to the
15 Environmental Flight. And the address for the
16 Environment Flight will be provided at the end
17 of the hearing. The address is also provided
18 on the written handout itself.

19 All written comments must be received
20 or postmarked no later than the 27th of June,
21 2006. If they are not received by then -- as
22 long as they are received by the 27th of June,
23 2006, they will be considered in preparation of
24 the final EIS.

25 If you would like to make a verbal

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1 comment, please fill out a green speaker
2 request card. And that is a green card,
3 they're available, and at the top it says,
4 Speaker Request Card. And they are available
5 from the staff. If you need a pen and
6 document, please raise your hand and someone
7 will provide it to you.

8 The purpose of this hearing in the
9 environmental process is to provide the
10 community an opportunity to hear about the
11 proposed action and the findings of the Draft
12 EIS. And, it is an opportunity for you as
13 members of this community to comment about the
14 potential environmental impact of the proposed
15 action.

16 Tonight's meeting is another step in
17 the environmental review process. The Air
18 Force held a public scooping meeting in June
19 2005. Comments raised during that scooping
20 process were evaluated in the Draft EIS.

21 You're encouraged as members of the
22 local community to identify your concerns
23 specific to this community and this particular
24 project. Your input and comments are important
25 to this project's environmental review.

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1 This is a public hearing and the
2 purpose of this hearing is to hear your
3 concerns. For this reason, with the exception
4 of administrative information, no responses
5 will be made by anyone this evening. Your
6 concerns will be addressed in preparation of
7 the Final EIS.

8 Several members of the program team are
9 here tonight and I would like to introduce you
10 to each of them. I request that they please
11 stand when I mention your name.

12 Tonight's speakers are: Colonel
13 Wilfred Cassidy, the mission support group
14 commander at Andersen Air Force Base, Guam; Lt.
15 Colonel Rowene Lant, the chief of the
16 Environmental Integration Branch, Headquarters
17 Pacific Air Forces in Hawaii; and Lt. Jennifer
18 Espinoza from the environmental planning
19 section at Andersen Air Force Base.

20 Attending this evening from the 36th
21 Wing at Andersen Air Force Base, the Civil
22 Engineer, Lt. Colonel. Marvin Smith and the
23 public affairs officer, Lt. John Griffin.

24 As I mentioned earlier, I am from the
25 United States Air Force Judiciary, Washington,

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1 D.C.

2 Now also, from the private consulting
3 firm, assisting the Air Force with the
4 preparation of the EIS, a parsons corporation,
5 there is, Ms. Elvira Gaddi and Mr. Taylor
6 Houston.

7 Colonel Cassidy will begin the
8 presentation this evening.

9 COL. CASSIDY: Thank you, Colonel
10 Hartsell. Good evening, ladies and gentlemen.
11 I'm Colonel Wilfred Cassidy, 36th Wing's Mission
12 Support Group Commander at Andersen Air Force
13 Base. And I'd like to welcome you. We
14 appreciate your taking time to join us this
15 evening.

16 Andersen plays an important role in the
17 defense of our nation. Guam, Hawaii and Alaska
18 form a strategic triangle, wedge from which the
19 United States can project airpower to
20 demonstrate commitment to regional security and
21 engagement, assure our allies, and dissuade or
22 deter aggression in the Asia-Pacific region.

23 We do this in a number of ways. For
24 example, the continuous bomber presence on
25 Andersen deters potential aggressors. In

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1 addition, our refueling, maintenance, and
2 munitions capabilities support military
3 activities around the world, including the
4 global war on terror.

5 The war on terror has taught the
6 military that we must be able to change the way
7 we do business to meet new threats to our
8 country. This is why we are here tonight. The
9 Air Force is proposing a change to the way we
10 operate our forces so we are better able to
11 defend America.

12 To support our military strategy, the
13 United States Air Force, specifically, Pacific
14 Air Forces Headquarters in Hawaii, is planning
15 to provide an ISR/Strike capability to assure
16 our nation's commitment to regional security
17 and peace in the Asia-Pacific region.

18 The purpose of the ISR/Strike
19 capability has a critical -- I'm sorry. The
20 proposed ISR/Strike capability has a critical
21 purpose and need.

22 The purpose of the action is to achieve
23 situational awareness before a crisis begins,
24 locate and identify critical adversary moves,
25 achieve success through air dominance, and

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1 deliver decisive effects via persistent and
2 precise application of air and space power.

3 This relocation is needed to
4 consolidate aircraft, personnel, and training
5 capabilities in one strategic location,
6 positioned to respond to any future
7 contingencies in the region.

8 To effectively plan our proposed
9 initiative, we are preparing an EIS in
10 accordance with the National Environmental
11 Policy Act, or NEPA, and Air Force
12 instructions. The Draft EIS was released to
13 the public on May 12, 2006, and you may have
14 already reviewed it.

15 This is where you come in. Tonight we
16 give you information on this action as we did
17 last summer at the scoping meeting. Our
18 consultants have completed the Draft EIS and
19 identified environmental impacts and
20 mitigation. We are asking for your input, so
21 please offer us your concerns, questions and
22 comments.

23 Specifically, tonight we will present a
24 description of the proposed action and
25 alternatives, the findings of the Draft EIS,

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1 the schedule the Air Force is working toward,
2 and then we will have an open session to hear
3 your questions and your concerns.

4 One thing to point out is, tonight we
5 will not discuss the potential Marine
6 relocation from Japan. This is an independent
7 action and will be considered in a separate
8 environmental documentation.

9 We will start the discussion with
10 Colonel Lant, the environmental integration
11 branch chief at Pacific Air Forces.

12 LT. COL. LANT: Thank you, sir. As
13 Colonel Cassidy has mentioned, the Air Force is
14 proposing to establish an intelligence,
15 surveillance and reconnaissance, or "ISR" and
16 strike capability on Andersen Air Force Base, a
17 key strategic location in the Pacific.

18 The proposed site for this new
19 consolidated function is at the main base of
20 Andersen Air Force Base.

21 Five key functions will become part of
22 this capability: Intelligence, surveillance,
23 reconnaissance, strike, and refueling.

24 The proposed action includes locating
25 aircraft on Andersen Air Force Base, stationing

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1 additional personnel and their families,
2 constructing new facilities, and training air
3 crews.

4 Here is a map of the north end of Guam
5 showing the location of Andersen Air Force
6 Base. Construction of new facilities would
7 occur primarily on developed areas of the main
8 base, currently an active airfield and
9 operational base used by both the U.S. Air
10 Force and the Navy.

11 Andersen Air Force Base currently has
12 about 5,900 personnel. Approximately 235
13 average daily aircraft operations are conducted
14 from the base airspace.

15 The Air Force initially considered six
16 different locations in the Pacific area as
17 potential sites where the capability could be
18 located. These are Iwo Jima in Japan, Saipan,
19 Diego Garcia, Wake Island, Hawaii, and Guam.
20 Based on the alternative evaluation and
21 screening process, Andersen Air Force Base was
22 the only location that satisfied all selection
23 factors for location of this capability.

24 The EIS evaluates three alternatives at
25 Andersen: (1) The no action alternative, (2)

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1 Alternative A, which would result in basing
2 tankers and UAV aircraft at Andersen Air Force
3 Base, and rotating fighters and bombers,
4 Alternative B would rotate aircraft from other
5 bases, with the exception of basing UAV
6 aircraft at Andersen.

7 The navy helicopters are already based
8 at Andersen and will remain in all
9 alternatives.

10 The no action alternative would
11 essentially be the continuation of existing
12 conditions.

13 The main difference between
14 alternatives "A" and "B" is whether the
15 refueling tanker aircraft are rotating or based
16 at Andersen Air Force Base.

17 Alternatives "A" and "B" will be
18 further described in the next two slides.

19 Alternative A would base four Global
20 Hawk unmanned aerial vehicles, or UAVs, and 12
21 air refueler aircraft at Andersen. Also, 48
22 fighters and 6 bomber aircraft would be rotated
23 from other bases.

24 The term "rotation" means personnel and
25 aircraft would temporarily stay at Andersen for

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1 a limited amount of time, normally between 3 to
2 6 months duration. After which time, they
3 return to their home station. A new rotating
4 group of aircraft and associated personnel
5 would replace them as needed.

6 This action would result in an
7 additional 3,000 personnel at Andersen by the
8 year 2016. Approximately 1,900 of these
9 personnel are both permanent and rotating
10 military, civilians, and contractor personnel.
11 The other 1,100 are military and civilian
12 dependents, their family members.

13 Daily aircraft operations are
14 anticipated to increase by 162, to a total of
15 397. An aircraft operation is one take-off or
16 one landing, so each take off and landing cycle
17 counts as 2 operations. The additional
18 aircraft operations would result from training
19 required by the aircrews associated with the
20 ISR/Strike capability.

21 Alternative B would permanently base 4
22 unmanned aerial vehicles at Andersen Air Force
23 Base. There would be 12 refueler, 48 fighter
24 and 6 bomber aircraft rotating from other
25 bases.

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1 The proposed action would result in
2 1,850 additional personnel on Andersen by the
3 year 2016, the majority being 1,750 military,
4 civilian, and contractor personnel. Since most
5 of the personnel are rotating at Andersen for a
6 short period of time, the numbers of
7 accompanying dependents are considerably low,
8 at around 100 family members, when compared to
9 Alternative A.

10 Finally, the Air Force projects an
11 increase of 146 average daily aircraft
12 operations to a total of 381. As with
13 Alternative A, the additional aircraft
14 operations would result from training required
15 by the aircrews associated with the ISR/Strike
16 capability.

17 My next slide shows the construction
18 needed to support the proposed ISR/Strike
19 initiative.

20 First of all, we emphasize that the air
21 force will complete the environmental process
22 in accordance with applicable laws before
23 making an action decision and beginning any
24 construction at Andersen. The EIS will be used
25 in our decision making process.

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1 The proposed ISR/Strike capability
2 would require the construction of new aircraft
3 operations centers, maintenance and repair
4 buildings for these aircraft, dormitory and
5 housing facilities and associated community
6 buildings. Supporting infrastructure and
7 service buildings would also be required.

8 The proposed construction program would
9 begin in 2007, in an estimated completion date
10 of 2016.

11 This slide shows a map of the main base
12 where the proposed construction activities
13 would occur.

14 The Air Force is proposing to construct
15 supporting facilities and infrastructure on
16 mostly developed land. However, the proposed
17 aircraft staging area and the commercial gate
18 area are expected to required removal of some
19 vegetation.

20 This concludes my project overview.
21 Lt. Jennifer Espinoza will now explain the NEPA
22 and environmental aspects of the program.

23 LT. ESPINOZA: Thank you, Colonel Lant.
24 I am Lt. Jennifer Espinoza from the
25 environmental planning office at Andersen Air

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1 Force Base, where I am responsible for the
2 environmental impact analysis process.

3 The National Environmental Policy Act
4 or "NEPA" is a law that requires any federal
5 agency to consider the environmental
6 consequences of any major federal action before
7 it approves a project. This allows the
8 decision maker to make an informed decision
9 with environment as a consideration.

10 The Draft EIS has identified potential
11 environmental impacts that may result from
12 implementation of this proposal.

13 The potential environmental impacts of
14 the alternatives were evaluated for the various
15 resources shown on this slide. Cumulative
16 impacts of the action were also analyzed in the
17 Draft EIS.

18 To minimize impacts, the proposed
19 action is located primarily on developed land
20 not part of the Guam National Wildlife Refuge
21 Military Overlay, which is cooperatively
22 managed by the Air Force, Guam Department of
23 Agriculture, and the U.S. Fish and Wildlife
24 Service.

25 The next two slides summarize the

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1 analysis in the Draft EIS.

2 Issues were identified in the following
3 resource areas: Noise, wastewater treatment,
4 solid waste disposal, biological resources, and
5 socioeconomics.

6 This slide is more analysis results
7 continued from the first slide.

8 The analysis indicates that most of the
9 impacts identified would not be considered
10 significant, and often such impacts can be
11 prevented or minimized through the use of
12 management practices or conservation measures.

13 The next slide shows the proposed
14 management practice or conservation measures.

15 This slide provides an overview of the
16 mitigation identified in the Draft EIS for the
17 school, wastewater, landfill, the National
18 Historic Preservation Act or NHPA, and housing
19 issues.

20 The new standard interior noise levels
21 at schools should be considered for a new
22 school construction and modernization of
23 existing schools. Interior noise can be
24 reduced through mitigative measures.

25 One of the ISR/Strike projects would

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1 construct a new DOD high school to relieve
2 potential classroom overcrowding.

3 The current permit for the wastewater
4 treatment plant is 6 million gallons per day.
5 The Guam Water Authority is improving the plant
6 and is coordinating a new permit with the
7 Environmental Protection Agency with the desire
8 for a permit to treat as much as 12 million
9 gallons per day.

10 Andersen Air Force Base plans to use
11 the new Government of Guam landfill when it
12 becomes operational and will use an expanded
13 on-base landfill in the interim. There is an
14 ISR/Strike project for a new on-base landfill
15 should the Government of Guam landfill not
16 materialize or be delayed.

17 Additional mitigation measures for any
18 potential affect on cultural resources will be
19 identified during the Section 106, the historic
20 preservation consultation process, which is
21 still ongoing.

22 The need for housing for temporary
23 migrant workers that would relocate to Guam to
24 build the ISR/Strike construction projects
25 could be accommodated through a combination of

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Court Reporter

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1 ways to include the following: using vacant
2 private houses, renovate and use currently
3 vacant hotel, and construct temporary housing
4 as a construction camp.

5 Biological mitigation is covered on the
6 next slide.

7 The Air Force has identified specific
8 conservation measures for the protection of
9 threatened and endangered species on Andersen
10 Air Force Base, which are shown on this slide.

11 Conservation measures were developed to
12 reduce impacts to threatened and endangered
13 species, specifically the Mariana crow, Mariana
14 fruit bat, Micronesian kingfisher, and Guam
15 rail.

16 The overall goals of the conservation
17 measures contribute to the critical habitat and
18 endangered species management objectives on
19 Guam. This includes the brown tree snake
20 management and removal, habitat restoration and
21 protection, and unwanted deer and pig impact
22 reduction and control.

23 The measures offer habitat protection,
24 some of which involve brown tree snake control,
25 which is a cooperative effort between the U.S.

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1 Fish and Wildlife Service, Department of
2 Agriculture and the U.S. Air Force. This
3 includes inspection, interdiction, procedures
4 and monitoring.

5 We are now in the 45-day public review
6 period for the Draft EIS which was initiated on
7 May 12. We will accept mail postmarked no
8 later than the 27th of June 2006 to be
9 considered in preparation of the Final EIS.
10 All comments reviewed in writing no later than
11 the 27th of June 2006 or provided verbally to
12 the court reporter tonight on the draft EIS
13 will receive equal consideration.

14 It is expected by August 2006, the
15 Final EIS will be completed. The public will
16 be notified of the availability of the final
17 EIS. The Final EIS is expected to result in
18 the record of decision.

19 Your comments and concerns are very
20 important to the planning of this project, and
21 the ability of the project to be accomplished
22 in an environmental friendly manner. We will
23 review your comments and letters, and this
24 input will contribute to the project planning.

25 Remember, your letters for this project.

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1 must be postmarked by June 27, 2006 to receive
2 consideration in the Final EIS.

3 Thank you for your interest in this
4 project. And now, I'll turn the meeting back
5 to our moderator.

6 Thank you, Lt. Espinoza. We will now
7 start the second part of tonight's meeting,
8 during which you may provide your comments.
9 Your comments will receive equal consideration
10 regardless if you provide them tonight or in
11 writing before June 27.

12 Here's how to make your comments: Let
13 me emphasize that no one will be responding to
14 any comments tonight, either in written form or
15 stated for the court reporter. But your
16 particular concerns are important.

17 Please be assured that your written and
18 verbal comments will become part of the record
19 of this meeting. And those dealing with
20 environmental issues will be addressed in the
21 environmental process.

22 If you wish to only submit written
23 comments, you may do so by giving them to one
24 of the staff members.

25 Again, there are comments forms for

1 those of you wishing to write your statement at
2 the back tables. Or, if you raise your hand,
3 somebody can provide it to you. The written
4 forms are in yellow. The verbal forms are in
5 green.

6 Now, those of you who have already
7 written your comments, please provide them to
8 one of the staff members now or at the end of
9 the hearing. If you have brought a prepared
10 statement, please make sure your name and
11 affiliation, if any, are on it, and submit it
12 with your comment form.

13 For those wishing to speak tonight,
14 here is the format. Many of you have filled
15 out and handed in a speaker form, the green
16 speaker form. If you did not and you want to
17 now, please raise your hand and one of the
18 staff will bring a form to you. The forms will
19 be handed to me and I will call you by name and
20 you may approach the microphone here to my left
21 and the podium.

22 Please begin your comments by clearly
23 stating your name and then spelling it for the
24 record. We have a court reporter here, and so
25 that the court reporter can transcribe your

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1 name later on, please spell it carefully. And
2 state any group or organization or affiliation
3 you're a member of. This, again, helps the
4 court reporter assemble the record. And then
5 you may begin your statement.

6 If the court reporter cannot hear you
7 well or understand something you may say, he
8 may interrupt and ask for clarification. When
9 a person is making a public statement, please
10 respect their statement and do not interrupt
11 them or talk amongst yourselves whether you
12 agree or disagree with the statement that he
13 may be making.

14 Comment time for each individual will
15 be limited to no more than 3 minutes. I will
16 let you know when you have one minute left.
17 This will apply to every speaker, including any
18 public officials who may wish to comment
19 tonight. In that way, we can make sure that
20 all people who have verbal comments will get to
21 make them. Remember, in addition to verbal
22 comments, you can also make written comments as
23 well.

24 Given this time limit, please honor any
25 request or motion that I may make for you to

1 conclude your remarks and stop speaking. To
2 help use your time effectively, remember, I'll
3 let you know when you have 1 minute left,
4 please prioritize so that you address the most
5 important comments first. And please be
6 assured that it will be part of the record of
7 this meeting.

8 Limit your comments and questions to
9 the subject of the proposed ISR/Strike
10 capability on Andersen Air Force Base, as this
11 is the topic and purpose of tonight's public
12 hearing. This EIS will not address any subject
13 other than the potential environmental effects
14 of this specific project on the base.

15 Now, if one of the staff members can
16 hand me any of the questions we have. Does
17 anybody have any verbal comments to make?
18 (lengthy pause) Please, if you can step
19 forward. Have you filled out a green card,
20 sir?

21 MR. SABLON: Yes, I did.

22 LT. COL. HARTSEL: And if you can
23 please hand that to a member of the staff and
24 approach the podium.

25 (speaker complies)

1 LT. COL. HARTSEL: Mr. Sablan, please,
2 the podium is yours.
3
4

5 **PUBLIC SPEAKER #1: ANTONIO SABLAN**

6 **(6:38 - 6:41 PM)**

7
8 MR. SABLAN: I'm kind of reluctant
9 because I came in late. My name is Antonio
10 Sablan. That is, S-A-B-L-A-N.

11 I guess my main interest in this is
12 that, how does this new activity in Andersen
13 protects me, here in Guam, as a Chamorro who is
14 colonized by the United States of America, as
15 to my homeland is being used as a so-called the
16 aggressive sector of the United States of
17 America potentially against other nations and
18 our neighboring countries and how does that
19 protect me? Do I become a better target or a
20 bigger target for other nations to attack Guam
21 and pretty much pulverize us?

22 The other thing is, and this is my
23 theme for many, many, years, is that, the very
24 land that you're talking about is my family's
25 property. And when we lost it by confiscation

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1 to the United States of America, my mom
2 couldn't afford to buy 12 dozen of chicken eggs
3 for every acre of land. And this must be one
4 of the most valuable piece of real estate in
5 the whole wide world, strategically. And I'm
6 sure any real estate person would tell you,
7 location, location, location. And if Guam is
8 so important -- how come Guam -- my mom
9 couldn't afford the 12 dozen of chicken eggs
10 when she lost her land to the U.S. Government?

11 And the last question I would like to
12 ask is that, Urunao, from my understanding, is
13 the neighboring sector of Andersen, and there's
14 a dump site there. And the dump site, from my
15 understanding, is that there is Agent Orange
16 that's been dumped there.

17 And from my understanding is that 40 to
18 60 parts per million of the Agent Orange was
19 used in Vietnam to defoliate the terrain of
20 Vietnam. From my understanding, in your own
21 study, the U.S. Military study, is that there
22 is like 17,000 to 19,000 parts per million that
23 is down at Urunao. And if there's any kind of
24 utilization, any kind of wind factor, like a
25 typhoon, all of those --

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1 LT. COL. HARTSELL: Mr. Sablan, one
2 minute, please.

3 MR. SABLAN: -- it gets stirred up, and
4 what is it? Are you putting your personnel
5 into hazard, as you have placed us for so long?
6 And it's an insultive (sic) to be placed, my
7 land, my culture, my everything, to be
8 disseminated, and the EIS, you give 3 minutes?
9 Gosh, and you take a life time away.

10 I don't expect you to answer quite
11 frankly. You guys are just going to screw us
12 up all over again.

13 LT. COL. HARTSELL: Mr. Sablan, thank
14 you for comments tonight. And, again, I remind
15 you, you can also submit written comments as
16 well.

17 Next speaker, Ms. Joanne M.S. Brown.
18
19

20 **PUBLIC SPEAKER #2: JOANNE M.S. BROWN**

21 **(6:41 - 6:44 PM)**

22
23 MS. BROWN: Thank you very much and
24 good evening. I hope I can keep track of all
25 the instructions. It's quite extensive.

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1 I'm a current member of the Guam
2 Legislature and also oversee the Committee on
3 Natural Resources that oversees certainly
4 Aquatic and Wildlife and Guam EPA.

5 Certainly it's a very direct
6 presentation in terms of the intended expansion
7 that will occur at Andersen. Certainly the
8 areas I'm pleased with is where you will expand
9 in the existing print of areas that are already
10 developed.

11 The areas where you are going to have
12 to be doing clearing, I'm sure that if you do
13 meet the requirements and I know that the key
14 agencies will probably be providing written
15 comment, but it's certainly in those areas we'd
16 like to see the cooperation of Andersen in your
17 presentation that you would take into
18 consideration what adverse impacts will occur,
19 and certainly where areas can be mitigated and
20 minimized.

21 Because we are finding Andersen,
22 because you do have such large land holdings up
23 north, are pretty much a partner with the local
24 community with regards to protecting a lot of
25 our natural resources, including our plant and

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1 bird species that are up there.

2 Wherever we can partner, as you
3 mentioned with regards to infrastructure, we're
4 talking about the issues of water, wastewater,
5 I do know Andersen has quite a substantial
6 amount of its own water wells on its property
7 and you are providing water to your residents
8 from there.

9 But areas with regards to wastewater
10 infrastructure, you mention with regards to the
11 partnering with the local community with the
12 new landfill, that is certainly something that
13 we would desire to see. Because Andersen also
14 has limited capacity in terms of its ability to
15 expand all the landfill space, because of
16 issues we're concerned with regards to our
17 ground water.

18 So, those are the areas where we would
19 be very interested in partnering with Andersen
20 where they can benefit also the local community
21 and also our utilities.

22 So those are the main areas of concern
23 that I have, and as I've mentioned, wherever
24 the impacts of adverse impact can minimized, I
25 think that would be the desired point.

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1 We're certainly aware of the capacity
2 of Andersen, the air base that you have up
3 there, the tarmac that you have up there that
4 can already accommodate the increase amount of
5 airplanes that you're planning on bringing in,
6 certainly the fuel capacity of Andersen is very
7 well known. And as I mentioned, any time and
8 anywhere you can minimize that to the existing
9 footprint of it is very much desired.

10 Thank you very much for allowing me the
11 opportunity to comment.

12 LT. COL. HARTSELL: Thank you, Ms.
13 Brown. And you may provide written comments as
14 well.

15 Do we have any other verbal comments?
16 Staff, are there any? This is the last call
17 for anyone who would like to voice a comment
18 tonight. (lengthy pause) Mr. Cole Herndon?

19 MR. HERNDEN: Yes, sir.

20

21

22 **PUBLIC SPEAKER #3: COLE HERNDON**

23 **(6:46 - 6:48 PM)**

24

25 MR. HERNDON: What makes me interested

1 in this is all your -- what constitutes the EIS
2 --

3 LT. COL. HARTSELL: Sure. Mr. Herndon,
4 please spell your name for the record.

5 MR. HERNDON: Oh, sure. C-O-L-E, H-E-
6 R-N-D-O-N.

7 LT. COL. HARTSELL: Thank you.

8 MR. HERNDON: What concerns me is
9 because what constitutes the Environmental
10 Impact Study also includes couple resources, if
11 I'm not mistaken.

12 And the thing that interests me most is
13 the historical part. So, during any
14 construction phase, and I'm sure you're going
15 to have your historians out there looking
16 around to see if you come across any -- like I
17 remember, it wasn't that many years ago, they
18 found a B-29, some of the crew members, and
19 they were actually able to repatriate some of
20 the bones from the B-29 named the Colleen. Of
21 course, you want to keep an eye out for that
22 kind of stuff.

23 Also, the last mission of World War II
24 was flown out of Northwest Field. So anything
25 of historical value needs to be considered.

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1 Now is the time to preserve it. Any -- like
2 they did over in Tinian, like the bomb pit.
3 Because something significant that we can
4 identify with the last mission, that needs to
5 be done. There were Chamorro villages up in
6 that area. That needs to be protected also.

7 So, all historical aspects need to be
8 reviewed. And I'm sure you're going to have an
9 historian that does that. That's about all.

10 LT. COL. HARTSELL: Thank you for your
11 comments, Mr. Herndon. And you may provide
12 written comments as well.

13 Do we have any other verbal comments
14 this evening? (lengthy pause) If there are no
15 other persons wishing to make comment, I will
16 conclude the verbal portion of the session.

17 Again, our hearing occurred on
18 Thursday, 1 June 2006. We're in the gallery
19 room located in the Guam Hilton, 202 Hilton
20 Road, Tamuning, Guam.

21 As a final reminder, the written
22 comment period for the Draft EIS is still open
23 until June 27, 2006. Therefore, any written
24 comments that you wish to submit to the Air
25 Force should be postmarked no later than June

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1 27, 2006. Please write those comments to:
2 Jonathan Wald, Environmental Planning Chief, 36
3 CES/CEV, Unite 14007, APO, AP 96543-4007.

4 There is a poster in the hallway there,
5 so if you didn't get the address of the slide
6 or from me speaking quickly, as I sometimes do,
7 you can get it off the poster out there in the
8 hallway.

9 Fax is also available for your
10 convenience. And the fax number is 671-366-
11 5088. The Air Force is unable to accept email
12 on this.

13 Once again, if you have not already
14 done so, please be sure you have signed a
15 registration form when you came in. Also be
16 sure you have turned in any completed written
17 comment sheets, or you may mail them before the
18 deadline.

19 Thank you again for taking part in this
20 planning process and for your time tonight.
21 For the record, the time is now 6:50 p.m. and
22 this public hearing is now closed.

23

24 (Hearing concluded at 6:50 p.m.)

25 **TAMUNING, GUAM, THURSDAY, JUNE 1, 2006**

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REPORTER'S CERTIFICATE

I, **George B. Castro**, Court Reporter, do hereby certify the foregoing 35 pages to be a true and correct transcript of the audio recording made by me at the time and place as set forth herein.

I do hereby certify that thereafter the transcript was prepared by me or under my supervision.

I further certify that I am not a direct relative, employee, attorney or counsel of any of the parties, nor a direct relative or employee of such parties, and that I am not directly or indirectly interested in the matters in controversy.

In testimony whereof, I have hereunto set my hand and seal of Court this 9th day of June, 2006.

COPY

George B. Castro

DEPO RESOURCES

George B. Castro

Court Reporter

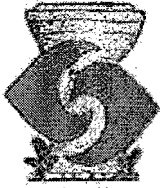
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**ERRATA SHEET to the Transcript for
Pacific Air Forces Public Hearing for the Draft EIS for ISR/Strike
Capability, Andersen AFB, Guam
1 June 2006**

No.	Page	Line	Transcript Text	Should be (Corrected Text)
1	Cover Sheet (1)	(6 th)	May 25, 2006	June 1, 2006
2	2	(6 th)	Andersen Air Force Base, Guam	Andersen Air Force Base (AAFB), Guam
3	2	(7-8 th)	Guam Hilton Hotel	Hilton Guam hotel
4	2	(5-26 ^h)	Private Consulting Firm (assisting the Force)	Parsons
5	2	(7-28 th)	Private Consulting Firm (assisting the Force)	Parsons
6	4	15-16	the gallery room	the Gallery Room
7	4	21	federal register	Federal Register
8	4	23	court reporter. So a	court reporter so a
9	5	6	federal magistral	federal magistrate
10	5	8	hear	here
11	8	18	scooping	scoping
12	8	19	scooping	scoping
13	10	4	a parsons corporation	Parsons Corporation
14	12	17	scooping	scoping
15	17	20-21	the air force	the Air Force
16	21	18	potential affect	potential effect
17	24	6	Thank you, Lt. Espinoza.	LT. COL HARTSELL: Thank you, Lt. Espinoza.
18	35	18-19	in the gallery room	in the Gallery Room
19	36	3	Unite	Unit

**PUBLIC INVOLVEMENT
COMMENTS ON DRAFT EIS**



Department of Parks and Recreation

Dipattamenton Plaset Yan Dibuetision

Government of Guam

490 Chalan Palasyo

Agana Heights, Guam 96910

Director's Office: (671) 475-6296/97; Fax (671) 477-0997

Parks Division: (671) 475-6288/89

Guam Historic Resources Division: (671) 475-6294/95/72;

Fax (671) 477-2822

Thomas A. Morrison
Director

Gregory A. Matanane
Deputy Director

A1

In reply refer to:
RC2005-216

June 01, 2006

Jonathan Wald
Chief, Environmental Planning
Department of the Air Force
36th Civil Engineer Squadron (PACAF)
Unit 14007, APO AP 96543-4007

Subject: Section 106 Consultation
Project: DEIS for ISR/Strike capability Andersen Air Force Base (RC 2005-216F)

Dear Mr. Wald:

A1-01 We have reviewed the sections from the above referenced document that specifically pertain to historic properties and which therefore fall under our jurisdiction. These sections include: 3-9, 4-9, and Appendix E. We have noted several omissions from the discussion, tables and maps and have listed these as questions below. In general, it appears that the document does not show the locations of sites from archaeological surveys conducted on the base over the past few years, or discuss possible impacts due to their proximity to the proposed actions.

- A1-02 1. Figure 3.9-2 shows neither the Tarague District nor the Jinapsan Complex, although these are referenced in the text.
- A1-03 2. Table 3.9-3 doesn't list recent work by IARII, MARS and PHRI although partially referenced in the text.
- A1-04 3. Page 3-71, line 13 reference to "a shelter of collapsed wood and metal which was built after the Chamorro had been contacted by the Spanish" is curiously vague. Just what is being referenced here, a structure from the late 1600's, one from the decades prior to WWII, or?
- A1-05 4. Page 3-71, line 36 references "areas of high potential for ... cultural materials", these should be shown on a map.

Considering the comprehensive treatment and level of detail provided in section 3-5 for biological resources there is a striking lack of the same provided for the archaeological and/or historical resources. This needs to be remedied.

We thank you for the opportunity to comment on this Draft EIS. We look forward to seeing the revisions. As always, if we can be of further help please do not hesitate to contact our office at 475-6294/5.

Sincerely,

Lynda Bordallo Aguon
State Historic Preservation Officer



United States Department of the Interior

FISH AND WILDLIFE SERVICE

GUAM NATIONAL WILDLIFE REFUGE

PO BOX 8134, MOU-3

DEDEDO, GUAM 96929

Telephone (671) 355-5096

Fax Number (671) 355-5098



June 20, 2006

A2

36 CES/CEV, Unit 14007
APO, AP 96543-4007

Dear Mr. Wald:

Thank you for this opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the establishment and operation of the ISR/Strike capability at Andersen Air Force Base, Guam.

General Comments

A2-01

The Aircraft Staging Area and the Commercial Gate projects will remove areas from the Overlay Refuge of Guam National Wildlife Refuge (GNWR) on Andersen Air Force Base. The GNWR should be notified by separate letter of the acreage to be withdrawn from the Overlay Refuge. These projects are in addition to the areas being removed from the Overlay Refuge by the projects for the Northwest Field Beddown of Training and Support Initiatives. The total areas from these projects should be included in the letter. The Overlay Refuge areas impacted by lighting and sound from these projects and the effects of lighting and sound should be described in the letter. The cumulative impacts of these projects and future actions will negatively impact the Overlay Refuge and the species dependent upon it.

We look forward to assisting you in implementing the Conservation Measures on the Overlay Refuge. We are available to help, if need be, with other Conservation Measures as well. If noise from low flying aircraft results in harassment of wildlife on the Ritidian Unit, a violation of the Code of Federal Regulations, we will pursue Adaptive Management and Ground Track Modification with you.

We are aware the Navy is also discussing an ungulate management plan for their lands. We recommend you investigate the possibility of combining efforts so that an ungulate management plan for all the Guam NWR Overlay Units can be developed. This planning effort must involve the Guam Department of Aquatic and Wildlife Resources.

Because specific details related to the relocation of Marines from Okinawa to Guam have not been released, we understand that the impacts of this impending move cannot be considered as part of the scope of this environmental review. We also understand that any cumulative environmental impacts resulting from all future DoD projects planned for Guam will be addressed by the Navy and Marine Corps as they go through their NEPA process. We do ask

that the Air Force be open to revisiting the specific details of the conservation measures proposed in this EIS, and the NW Field Beddown EA, once more is known about additional DoD projects. Conservation measures that seem appropriate and effective now, may lose their positive environmental impact once development plans for adjoining Navy lands are revealed. The proposed ungulate exclosures and HMU may not be feasible areas to conduct research and habitat restoration if additional blast arcs/flight lines/etc. will impact the area.

Specific Comments

- A2-02 | On page 2-5 line 40 the statement should read "**Part** of Andersen AFB is within the Guam
- A2-03 | On page 3-49 line 6 the statement should read "the **strand** vegetation along the
- A2-04 | There are only 371 terrestrial acres in the Ritidian Unit of the Guam NWR. The statement on page 3-56 line 30 should be corrected.

We appreciate the opportunity to provide comments on behalf of Guam National Wildlife Refuge. Our Pacific Islands Fish and Wildlife Office in Honolulu, Hawaii will provide comments concerning Endangered Species. Thank you for keeping us informed on the proposed activities; we look forward to working cooperatively with you now and in the future.

Sincerely,



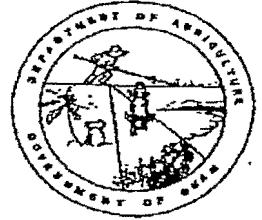
Chris Bandy
Refuge Manager

cc:
DAWR, Guam
USFWS ES, Hawaii
COMNAVMARIANAS, Guam



Department of Agriculture Dipattamenton Agrikottura

163 Dairy Road, Mangilao, Guam 96913



Felix P. Camacho
Governor

Kaleo S. Moylan
Lt. Governor

Director's Office	734-3942/43; Fax 734-6569
Agricultural Development Services	734-3946; 735-3946; 735-3950
Plant Nursery	734-3949
Aquatic & Wildlife Resources	735-3955/56; Fax 734-6570
Forestry & Soil Resources	735-3949/51; Fax 734-0111
Plant Inspection Station	475-1426/27; Fax 477-9487

Paul C. Bassler
Director

Joseph D. Torres
Deputy Director

A3

June 22, 2006

Scott Whittaker
Environmental Flight Chief
36 CES/CEV, Unit 14007
APO, AP 96543-4007

Re: Draft Environmental Impact Statement for the Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability, Andersen Air Force Base, Guam

Dear Mr. Whittaker:

Thank you for providing the opportunity to comment on the Draft Environmental Impact Statement (EIS) for the Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike (ISR/Strike) Capability, Andersen Air Force Base (AAFB), Guam. Andersen Air Force Base Notice of availability of the Draft EIS was published in the Pacific Daily News on May 14, 2006. An official copy to the Department was received on May 8, 2006.

The proposed action includes facility construction; alteration or renovation of existing structures; addition of utility infrastructure; day and night training activities on Northwest Field; and the basing of approximately 3000 additional military, civilian, and contractor personnel and dependents at Andersen AFB. Activities would begin in 2007 with construction projects and would be completed by 2016, with recurring operations continuing after that date. The action would entail the stationing of various aircraft including 48 fighter planes (F-22 and F-15E fighter jets), 6 bombers, (B-1, B-2, B-52), 4 Unmanned Aircraft Vehicles (UAV) and 12 tanker planes (KC-135). Support personnel would either be located on AAFB or brought in on a rotational basis. Dependents of support personnel would only accompany non-rotational personnel.

This letter has been prepared under the authority of and in accordance with provisions of the National Environmental Policy Act of 1969 [42 U.S.C 4321 et seq.; 83 Stat. 852], as amended (NEPA), the Endangered Species Act of 1973 [16 U.S.C 1531 et seq.; 87 Stat. 884], as amended, and other authorities mandating concern over environmental values. Based on these authorities, we offer the following comments for your consideration. We offer the following comments on the Draft Environment Impact Statement (EIS) for the proposed activities described in the document as they relate to the Biological Resources.

A3-01

The purpose of the proposed action is to locate the U.S. Pacific Command's ISR capability, aerial refueling, aircraft, and support personnel in the western Pacific on Andersen AFB on Guam. The objective of the ISR/Strike capability is to achieve pre-engagement battle space awareness, and to provide quick and efficient response in times of need. Three options were considered in the Draft EIS; Alternative A requires the implementation of all activities, Alternative B will require the rotation of essential personnel to ISR/Strike activities, and the No Action Alternative where by base activities remain status quo. The draft EIS states the proposed project will have no adverse impacts on threatened and endangered species, including habitat deemed essential to the recovery of the endangered Mariana crow (*Corvus kubaryi*), Guam rail (*Gallirallus owstoni*), Guam Micronesian kingfisher (*Halcyon cinnamomina cinnamomina*), *Serianthes nelsonii* and the threatened Mariana fruit bat (*Pteropus mariannus mariannus*). The Department prefers the No Action Alternative as this action imposes the least impact to the natural resources as they relate to Threatened and Endangered (T & E) species.

The U S Fish and Wildlife Service (USFWS) proposed designation of critical habitat for the listed species above that included proposed project area (Federal Register 67 (199): 63738-63772). The USFWS did not designate the area as critical habitat (see Federal Register 69 (208): 62944-62990, October 28, 2004) because the National Defense Authorization Act of 2004 (Public Law No. 108-136) allowed for the exclusion of such designation of DOD lands when an Integrated Natural Resource Management Plan (INRMP) is in place to manage these lands. These lands were not designated because of "the benefit to the bat and birds of the foregoing management and stewardship actions detailed in the updated Andersen Air Force Base INRMP" (2004 FR 69:62944-62990). The Draft EIS comes at a time as the designation of critical habitat was not made and the INRMP was to have aided in the protection and recovery of listed species.

A3-02

The Draft EIS considered the cumulative impacts of other proposed project actions. They include the Northwest Field Beddown activities, and the construction of 60 additional igloos in the Munitions Storage Area, AAFB. These actions combined will impact approximately 122 hectares of habitat, including 47 hectares in Northwest Field, 0.22 hectares for the Munitions Storage Igloos, 7.5 hectares for the Commercial Gate and Truck areas, and the largest, 66.0 hectares for the Aircraft Staging Area (ASA) in Andersen AFB. A family-housing complex in Figure 2.2-3 (p. 2-15) will be constructed in forested area (1.5 ha), but Figure 3.2-1 shows that the housing complex will not be in forested habitat. Discussions with Andersen AFB managers also indicated that this figure was not correct, and no housing will be built in the forested area. The final EIS should include that correction.

- A3-03 We view that loss of 122 hectares will impact the recovery and preservation of Guam's native wildlife, especially the federally endangered Mariana crow (*Corvus kubaryi*), Micronesian kingfisher (*Halcyon c. cinnamomina*) and threatened Mariana fruit bat (*Pteropus m. marianensis*). Though mentioned briefly (p. 1-3) the relocation of 8000 Marines from Japan to Guam emphasizes the need to reevaluate the cumulative effects of all projects in the foreseeable future (Pacific Daily News, April 25, 2006, Vol: 38, No. 83). Furthermore, a June 5, 2006, article in the European and Pacific Stars and Stripes indicates that the Navy Computer and Telecommunications Station (NCTS), Finegayan, is being considered. If limestone forest on NCTS is developed, it will further reduce the available habitat to support recovery of listed species in northern Guam. Therefore, we recommend that the Air Force wait to finalize the draft EIS until this information is available so that the cumulative impacts can be adequately addressed. The amount of area to be affected by all actions could increase significantly further impeding the recovery of T&E species.
- A3-04

- Of great concern are the activities proposed for the ASA and family housing complex. The ASA proposed activities would result in the clearing of 66-ha area (for both alternatives A and B), and include the installation of a new road to circumvent the proposed aircraft area, as well as facilities to house aircraft and airfield in the immediate area. The Draft EIS indicated that Mariana fruit bats utilize the area (Figure 3.5-4, p. 3-53) suggesting the importance of the area to fruit bats. Also, the proposed activities would place the airfield activities much closer to the cliffline areas where future recovery efforts will be focused. Furthermore, the area impacted by the proposed activities when considered in conjunction with the footprint of noise levels could be significantly greater as result of the increased level of aircraft traffic as airfield operations are projected to increase from 234 to 397 flights per day. Though habituation of fruit bats to noise is perceived as most likely to occur, the Draft EIS sites a study of a megachiropteran (p. 4-62). There may be differences in tolerances to noise levels between the species, and also, Mariana fruit bats are known to fly from the island of Rota to Guam providing a source for the Guam population. It is unknown if bats would stay in the area with the increase in noise due to aircraft.
- A3-05
- A3-06
- A3-07

- Conservation measures to be implemented to mitigate the impact of these activities were delineated in the Draft EIS. The conservation measures put forth in the Draft EIS include hiring of a wildlife management specialist, ungulate fencing of a 298-hectare area, ungulate management control programs, out-planting of foraging trees for crows and bats, vegetation surveys, Area 50 and a new habitat management unit (HMU). According to discussions with Base natural resource managers, the HMU will be the whole 60-hectare area, eliminating the need to install a fence through the habitat. We concur that the HMU will provide the setting for testing and implementing measures for controlling brown treesnakes, deer and feral pig, feral cats, rodents and for the restoration of native plants. This area will combine with work in "Area 50" to facilitate efforts to reintroduce native species of birds. The Final EIS should discuss how the wildlife management specialist would be fully equipped with staff and funding to implement the management actions mentioned in the conservation measures.
- A3-08

A3-09 Ungulate eradication will require a professionally designed and implemented plan. It is strongly advised that outside expertise is utilized to write and help implement this plan. The AAFB Wildlife Management Specialist can play a key role in facilitating this effort. Reliance on volunteer hunters (e.g. AAFB Conservation Officers) to conduct ungulate eradication efforts in enclosures of the size proposed has typically been unsuccessful. Worldwide techniques and strategies to control ungulates are advancing significantly and implementation of these techniques to ensure the net goal of proposed ungulate management efforts are achieved quickly in a cost-effective manner is strongly encouraged. Successfully removing and maintaining the proposed ungulate enclosures will require a long-term investment in this proposed conservation measure and commitment by the Air Force.

We have discussed with Air Force officials a list of alternate sites for the Area 50 project. DAWR, along with other Area 50 project stakeholders, have proposed that the area encompassing the "Bomb Renovation" Area be used as an alternative site. This area, located on the south end of the Munitions Storage Area, would be the most acceptable site given the diversity of the forest, terrain, and size of the area. This site is well outside the proposed action area. Furthermore, there are existing roadways that would minimize impacts to clear areas to construct a snake barrier to enclose the area. The retention of a similar site is critical to the implementation of recovery projects that include the exclusion of snakes, and the development and testing of methodologies to remove snakes.

A3-10 We are appreciative of the Air Force's support of the "Area 50 project", which has been a multi-agency conservation project for federally listed species. However, the planning and implementation of the proposed project has precluded the use of Area 50 for conservation activities. This Area 50 project is listed in Andersen AFB's Integrated Natural Resources Management Plan (INRMP) and we would suggest the Final EIS discuss how the Air Force intends to implement the objectives of the Area 50 project since the proposed action excludes its implementation at its current site.

Andersen AFB has a program to allow hunting within the boundaries of the proposed construction for feral pig (*Sus scrofa*) and deer (*Cervus mariannus*). However, the exclusion of these areas to hunters places a potential burden on native habitat, as these animals will move out of these highly used areas. The use of depredation permits from DAWR to control these animals may be insufficient to control the impact of ungulates.

A3-11 We would like to see in the Final EIS a more detailed plan of: 1) how ungulate impacts
 A3-12 will be controlled, 2) plans to provide hunting opportunities in other DOD sites to
 A3-13 compensate for the loss of hunting opportunities, and 3) the potential impact of displaced
ungulates on other areas of Andersen AFB.

Brown Treesnake

We appreciate the Air Force's positive steps toward brown treesnake (*Boiga irregularis*) interdiction through the AAFB Brown Treesnake Control Plan. The Air Force must assure that consistent funding is available to the US Department of Agriculture-Wildlife

Services (USDA-WS) to sustain the 100 percent inspection rate of all cargo, vehicles, munitions, household goods and other items departing Guam from AAFB or other sites off-base on Guam where Air Force materials, goods, vehicles, and cargo are staged for departure from Guam. The Draft EIS addresses areas relevant to the accidental transport of brown treesnakes (BTS), p. 3-37. With regards to brown treesnake interdiction, the Final EIS indicates that the Andersen AFB intends to fully fund the BTS interdiction program and research programs aimed at eliminating BTS. Brown treesnake interdiction programs should be adequately funded on an operational level and expanded to include activities in AAFB resulting in increased flight arrivals and departures. We recommend that the Air Force work with USDA-WS and the US Fish and Wildlife Service cooperatively to develop a mechanism that will estimate the costs for Wildlife Services BTS interdiction efforts at a 100 percent level on AAFB 18 months in advance to provide consistent and reliable funding.

A3-14

This estimated level of funding, based on the volume of cargo and vehicles leaving AAFB to off-island destinations, should be requested and funded as part of the AAFB Operations budget annually. To ensure that the orders to inspect cargo meet the Department of Defense (DOD) Defense Transportation Regulation, we maintain that regulation protocols 505 and 506 should be incorporated into the AAFB Brown Treesnake Control Plan and are appendix to the Final EIS document. The importance of long-term adequate and consistent office and kennel space for Wildlife Services brown treesnake interdiction efforts on AAFB is essential. Efforts should be made to identify and secure space for greater than a five year period.

A3-15

Conservation Measures, p. 2-28- The Draft EIS outlines in the document a long list of conservation measures to mitigate the impacts to T & E species. We recommend that the Final EIS include the following mitigation actions in addition to those mentioned in Draft EIS:

A3-16

1. The Wildlife Management Specialist should be fully funded and equipped with adequate staffing.

A3-17

2. The Air Force adequately mitigate for the loss of native limestone forest. Though the amount of area proposed for exclosure-fencing is 200 hectares, it does not produce a net gain in forested habitats for T & E species. Therefore, we recommend that the areas proposed for clearing during the second phase of the MSA Igloo project and areas subject to disturbance associated with training in the Northwest Field and ISR/Strike project (e.g., forest adjacent to the proposed aircraft staging area under the proposed ISR/Strike project) be assessed in the cumulative impacts and appropriately mitigated. The cumulative loss of habitat will impact whether the remaining forest in northern Guam will be sufficient to support the recovery of federally listed species. For example, the recovery criteria for the Guam Micronesian kingfisher call for 1,000 individuals in northern Guam. Average territory size estimates of Pohnpei Micronesian kingfishers indicate that approximately 10

hectares are needed to support a pair. If the 1,000 individuals in northern Guam were paired, approximately 5,000 hectares of kingfisher habitat would be needed to support this population. Potentially, more areas could be fenced to improve the overall quality of forest that is left for such species.

- A3-18 | 3. Ungulate exclosure fencing should minimize clearing to install this structure. Three hundred and ten (310) meters of fence line is reportedly involved in the removal of vegetation. Consideration to realigning the exclosure fencelines to follow existing roads would minimize, if not eliminate, the need for anymore clearing. Reforestation of native trees including *Eleaocarpus joga*, *Artocarpus marianensis*, *Pisonia grandis* and other native species. The Draft EIS proposed the relocation of certain species to other areas (*Tabernaemontanna rotensis*). However, such attempts can only be successful in areas protected from ungulate damage.
- A3-19 | 4. Brown Treesnake Research As mitigation for proposed Air Force expansion and the cumulative effects of DOD expansion on Guam, we recommend that the DOD provide sustained Base funding for applied brown treesnake research efforts by the United States Department of Agriculture-Wildlife Services National Wildlife Research Center (NWRC). The applied research efforts funded by the DOD should focus on: 1) developing aerial broadcast techniques for snake toxicants; 2) development of artificial lures and attractants for brown treesnakes; 3) the development of more cost-effective strategies to control or eliminate brown treesnakes from quarantine and field situations; and 4) the detection and capture of brown treesnakes at low densities. We suggest that the research scope and direction of NWRC efforts be determined by DOD, Wildlife Services Operations, NWRC, DAWR, and Service staff through annual and multi-year goals with discrete, finite goals. It should be emphasized that the development and implementation of the aforementioned research goals will increase the effectiveness of the interdiction program, support large-scale control programs for listed species, like the proposed control program at Pati Point (see Proposed Conservation Measure Number 5 below for additional information), and will ultimately reduce the cost while increasing the geographic scale of brown treesnake control on Guam.
- A3-20 | 5. Brown Treesnake Trapping at Pati Point. The Air Force is also proposing to control brown treesnakes at the Mariana fruit bat colony at Pati Point. Though we feel that the ultimate goal of this proposed effort will be beneficial, we are concerned about the level of disturbance that this effort may cause to the fruit bat colony. Due to poaching pressure, the Mariana fruit bat colony is highly susceptible to human disturbance and the available brown treesnake control measures need to be set up and maintained by personnel. We are concerned that brown treesnake control measures cannot be placed at effective distances from the bat colony without causing disturbance to the individuals in the colony. It is therefore imperative that new control techniques be developed for

brown treesnake control at the bat colony. We recommend that the Air Force include the development of these control techniques as part of their proposed conservation measure to help ensure control measures benefit the Mariana fruit bat population. We recommend that the Air Force include as part of their project, the ultimate goal of increasing juvenile bat survival and recruitment through brown treesnake control. Currently the proposed project focuses only on the proximate goal of reducing snake numbers in the area and not the ultimate goal of promoting recruitment in the bat population. This project should consider other methods besides trapping for controlling BTS around the fruit bat colony in Pati Point. Alternative methods should be pursued to minimize disturbance to the colony yet reduces the impact of snakes on the colony.

- A3-21 | 6. Air Force proposal to complete a study on the effects of aircraft noise on Mariana fruit bats and Mariana crows and to use data from this study to modify aircraft ground track locations, airspeed, and/or altitude to potentially avoid or minimize impacts to these species. We agree that these measures are important, however, we believe that there is not enough information available to assume that these measures will be effective. For example, the Mariana fruit bat colony could abandon the Pati Point site if aircraft disturbance (noise levels and frequency) reaches an unacceptable level to individuals in the colony. This may cause the colony to move to a site that increases its exposure to poaching. If the colony abandons the Pati Point site, modifying aircraft flight operations will likely provide little benefit to the species.
- A3-22 | Therefore, we recommend that the Air Force also consider the potential impact of bats abandoning the Pati Point colony site and develop appropriate measures, including offsite mitigation, to offset this impact if it occurs. As stated in the draft EIS, the majority of the Mariana fruit bat population on Guam is located at the Pati Point site. The abandonment of this site and its potential impact on the colony members could determine the fate of the Guam population.
- A3-23 | 7. Vegetation Surveys Relevant to Recovery of Mariana Fruit Bat and Mariana Crow should include funding not only to conduct surveys but also provide funding for implementing corrective actions to improve remaining habitat important to T &E species.
- A3-24 | 8. Much of Andersen AFB has been identified as important habitat to the recovery of species, the Final EIS should include further assurances that reintroduction of endangered species to native habitat will not be impeded by the proposed action.
- A3-25 | 9. With regard to the HMU, the Air Force needs to ensure that it will fund the completion of the snake barrier around this site. Due to cost, the fence should be designed so it can be retrofitted to reduce cat and deer movement at a later date. An existing snake exclosure (Figure 2.2-7) of similar height has

significantly reduced deer foraging on understory vegetation and has been very successful at stopping pig foraging on vegetation. Funding the installation of the snake barrier to encompass this site should be part of this action.

A3-26

10. With the increase of stationed personnel on AAFB, we strongly recommend a greater accountability with regard to family pets. Whether obtained off-island or on-island, dogs and cats must be registered with the Air Force veterinarian upon arrival to AAFB. Unfortunately, there is no regulation in place for documenting the location of these animals once a family leaves Guam. There is speculation that pet cats from AAFB personnel are abandoned prior to owners departing Guam. These feral cats are detrimental to the recovery of the flightless Guam rail. We suggest that once a pet is registered, the owner's responsibility include reporting to the veterinarian any transfer of ownership (with the new owner then registering the pet) or death of the pet (must show evidence of death).

Specific comments/corrections:

A3-27

Page 1-3 Past, Present, and Reasonable Foreseeable Future Actions. We recommend the Air Force also evaluate all potential actions by Federal agencies in the final EIS. For example, the Army Corp of Engineers is reviewing a permit to build an access road to the Jinapsan Beach area from Tarague Beach. This action was not included in the draft EIS even though it does have the potential to impact natural resources in northern Guam.

A3-28

Page 1-4, Line 36-40. Detailed info on flight training is unavailable at this time.

A3-29

Page 2-26, Table 2.2-5. The unit of measure is not indicated in the table. It appears to be hectares.

A3-30

Page 2-26, Lines 10-12. Reference is made to Figure 2.2-6 to facilities in the Commercial gate area. The figure does not indicate where the facilities will be positioned, nor if the all area will be cleared.

A3-31

Page 2-43. Figure 2.4-1. The figure indicates that the Combat Arms Training and Maintenance Facility (Project 13, also Table 2.4-1) is outside the location of the figure, but there is no indication where it will be located. We recommend that additional information about the location of the proposed Combat Arms Training and Maintenance Facility be included in the final EIS.

A3-32

Page 2-58, Section 2.4.3. We recommend that additional information about Transportable Airlift Control Element Unit and Logistics Unit be included in the final EIS. The draft EIS provides information on the number of personnel and states no construction will occur, but does not provide information on whether the operations or training associated with this unit will impact biological resources. For example, will training for the Airlift

Unit require the transport of goods from Guam to other areas or will training occur in the northwest field area of AAFB? The operation and training associated with these units may have impacts on biological resources on Guam and brown treesnake interdiction efforts that may need to be addressed.

- A3-33 | Page 3-25, Line 30-31. Correct scientific name of ifit from *Intsia bijunga* to *Intsia bijuga*, and faniok from *Trisiropis obtusangula* to *Tristiropsis obtusangula*
- A3-34 | Page 3-26, Table 3-5-1. "Chomolina" should be corrected to "Chromolaena".
- A3-35 | Page 3-28, Line 9. Correct spelling of scientific name from "*Luecanea*" to "*Luecaena*". Also, the local name for this plant is Tangantangan, while Haole Koa is the local name used in Hawaii.
- A3-36 | Page 3-28, Line 23. Correct spelling of *I. bijunga* to *I. bijuga*.
- A3-37 | Page 3-38. Table 3.5-3. Remove ")" after *Ixobrychus sinensi*.
- A3-38 | Page 3-39, Line 1. Replace name of crow from "Marina" to "Mariana".
- A3-39 | Page 3-44, Line 5. Remove double punctuation at the end of the line.
- A3-40 | Page 3-44, Line 20. Place a period after the "S" in *S. nelsonii*.
- A3-41 | Page 3-50, Line 3-4. Rail main captive population is on Guam. Micronesian kingfishers are also being bred on Guam.
- A3-42 | Page 3-50, Line 24-25. Prior to 2005, only the Mariana fruit bat population on Guam was federally listed. The statement that the population in the Commonwealth of the Northern Mariana Islands was listed as threatened when the Guam population was listed as endangered is incorrect.
- A3-43 | Page 3-51, Line 5. Brooke 2006 is cited but in the reference Page 8-1, it is cited as Brooke 2005. There needs to be consistency with the references.
- A3-44 | Page 3-52, Line 38-39. The Guam Micronesian kingfisher was recorded along the survey transect (transect nine) next to the proposed aircraft staging area in 1981, therefore kingfishers likely utilized the vegetation proposed for clearing in the project area. If the Air Force is defining this area as Andersen main, then the statement about kingfishers not being present in 1981 is incorrect.
- A3-45 | Page 4-59/60, Table 4.5-4. The estimated Mariana crow suitable habitat that will be cleared is presented as approximately half the amount of suitable Mariana fruit bat habitat even though they both include the same vegetation types. We believe the estimated suitable Mariana crow habitat should be equal to the current estimate of suitable Mariana fruit bat habitat in the final EIS.

- A3-46 | Page 4-61, Lines 25-29. The assessment of project impacts on Mariana fruit bat habitat does not include an assessment of indirect habitat loss due to human disturbance activities. Forested areas adjacent to the proposed aircraft staging area will be exposed to human activity that may limit the potential of these forests to support the long-term conservation of the Mariana fruit bat. We recommend that these indirect impacts and associated acreage also be included in the assessment on potential habitat loss for this species.
- A3-47 | Page 4-65, Lines 22-34. The assessment of project impacts on Mariana crow habitat does not include an assessment of indirect habitat loss due to human disturbance activities. Forested areas adjacent to the proposed aircraft staging area will be exposed to human activity, including aircraft noise that may limit the potential of these forests to support the long-term conservation of the Mariana crow. We recommend that these indirect impacts and associated acreage also be included in the assessment on potential habitat loss for this species.
- A3-48 | Page 4-67, Lines 30-34. The assessment of project impacts on the Guam Micronesian kingfisher does not include an assessment of loss of the habitat needed to support the recovery of the species on Guam. The draft EIS only states that habitat within the MSA, a proposed reintroduction site, will not be impacted by the proposed project. We recommend that the Air Force consider the effects of direct and indirect habitat loss on the long-term conservation of the Guam Micronesian kingfisher.
- A3-49 | Page 4-74, Line 2-5. DAWR has observed nest site fidelity in nesting pairs both on Guam and Rota when these nesting pairs experience nest success. The lack of nest site fidelity may be due to the lack of nesting success.

Thank you for providing us the opportunity to comment on the Draft Environmental Impact Statement Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability Andersen Air Force Base Guam. If you have any questions, please contact Celestino Aguon, Acting Chief, at 735-3979.

Sincerely,



PAUL C. BASSLER

cc: USFWS Ecological Services, Honolulu
USFWS NWR, Guam
USDA – WS, Guam
Bureau of Statistics and Plans, Government of Guam
GEPA, Government of Guam

**GUAM ENVIRONMENTAL PROTECTION AGENCY****AHENSIAN PRUTEKSION LINA'LA GUAHAN**

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A4

Mr. Jonathan Wald
Environmental Flight
36 CES/CEV Unit 14007
APO, AP 96543-4007

JUN 27 2006

RE: Draft Environmental Impact Statement, Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability Andersen Air Force Base, Guam

Dear Mr. Wald

Guam EPA has reviewed the above referenced DEIS and has the following comments.

CERCLA Sites:**A4-1**

There are sites on Andersen Air Force Base that are under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the Military Munitions Response Program (MMRP). It is imperative that the Air Force identify all CERCLA sites and ensure that this project does not negatively impact or delay cleanup of CERCLA/MMRP sites, e.g., restricting access to perform restoration activities.

Wastewater:**A4-2**

All new water used for industrial and aircraft use shall be sent to the wastewater treatment plant. No surface discharge of water from oil/water separator shall be allowed. Wastewater systems upgrades and individual wastewater disposal systems must comply with Guam EPA Wastewater Regulations. AAFB will have to negotiate with the local government to the amount of wastewater from the base, allowed to be treated at the Northern Sewer Treatment Plant and possibly share in the up-upgrades and maintenance costs of the sewer distribution and treatment once the existing wastewater MOU expires in 2010.

Stormwater:**A4-3**

According to the DEIS, new stormwater runoff from the proposed impervious surfaces will increase 19% and will be discharged into underground injection controls (UICs) and will meet Drinking Water Standards. Upgrades to stormwater systems will be required to accommodate any additional increases to the capacity of the system.

Page 2, DEIS Establishment and Operation of an ISR/Strike Capability

- A4-4 | The Agency requires that prior to underground recharge, stormwater is pretreated for the initial portion of the storm event to treat and capture any contaminants in the runoff in accordance with the Agency's new Stormwater Management Manual.
- A4-5 | Approximately 174.5 acres of impervious surfaces will need pretreatment prior to recharge into dry wells. Guam EPA requires that all stormwater be addressed on-site whenever possible. New expansion construction and upgrades to air strips or other impervious surfaces that are susceptible to petroleum leaks and spills should have an oil water separator system. All UICs must have pretreatment prior to recharge.

Groundwater Resources:

- A4-6 | 11. Sec.3.6: Statement is made that infiltrating ground water is relatively free from Point Source Contamination. Please provide supporting data. The implementation of the proposed facilities and expansion of activities may increase surface source
- A4-7 | contamination. Section 3.6: Infiltrating ground water is not "naturally filtered" by hundreds of feet of limestone, this may be inaccurate. The Northern Guam Lens is being considered by the Agency as Ground Water Under Direct Influence of surface water.

Aircraft Noise Impacts from Alternative A:

- A4-8 | According to the DEIS table 4.1-2, Off-Base Schools in the area of the proposed Airfield Operations Activity will experience a +21dBA increase in aircraft noise from a baseline of 41dBA to a 62dBA level. Lectures in nearby schools may be impaired by the aircraft noise louder than 45dBA. People have to raise their voices when background noise exceeds 45-50 dBA (USEPA 1974). The Air Force is encouraged to contact affected schools and provide technical information on sound proof buildings, provide sound proofing materials and or grant monies to mitigate the noise impacts to Off-Base Schools by the proposed activity.

Clearing and Grading:

- A4-9 | A total of 182.6 acres is subject to clearing. Clearing and grading activities will require Guam EPA permits. Agency permit fees shall be paid where applicable. The Agency is discouraging green waste entering into the Ordot Dump, to increase the facility's
- A4-10 | lifespan. Vegetative waste should be composted, mulched and diverted from the waste stream going to the facility. An Environmental Protection Plan (EPP) is required for
- A4-11 | clearing and grading activities. Prior to the commencement of earthmoving activities,
- A4-12 | local government clearances from the Department of Agriculture, Department of Parks and Recreation, Historic Preservation Office must also be obtained.

Page 3, DEIS Establishment and Operations of an ISR/Strike Capability

- A4-13 | *Table 2.2-5 Proposed Forest Habitat Clearing:* The table needs to identify the measurement units of the area if measured in feet, meters, acres, etc. The area units are not given in the table.

Construction and Demolition (C&D) Debris:

- A4-14 | Approximately 26,766 tons of construction and demolition waste will be generated by the proposed activity. Should the demolition and hardfill be disposed outside of Andersen Air Force Base, the current inventory of permitted hardfill sites must be evaluated if they can accommodate the estimated quantities. Any materials that can be recycled or re-used should be diverted from the waste stream to extend the lifespan of the municipal solid waste landfill.

Off-base Housing:

The increase in off-base population would occur as a result of the importation of labor necessary for construction. These contract workers can rejuvenate the local rental market by renting existing available dwellings. The utilization of vacant rental units off-base will provide an incentive for landlords to renovate and clean up many idle and abandoned dwellings, contributing to cleaner and well maintained homes in the community.

- A4-15 | Housing Facilities for Temporary Workers (Barracks) should be discouraged if the facilities are not in a compatible land use surroundings and are not supported by the availability of adequate infrastructure or the local community.

Environmentally Designed Buildings:

Guam EPA encourages that the proposed dwellings, dormitory, classrooms and offices be designed for Radon Resistant New Construction Buildings, when these structures are built over limestone geology. The Agency also encourages the use of energy efficient lighting and appliances whenever possible. The Guam Energy Office may be a good resource of information on energy conservation technologies and practices.

Wildlife Resources:

The Air Force is encouraged to avoid environmentally sensitive areas whenever possible to prevent or minimize negative impacts to endangered or rare flora and fauna. The Air Force is encouraged to work with federal Fish and Wildlife Services and the local Division of Aquatic Wildlife Resources, Department of Agriculture in avoiding and mitigating impacts. An extensive integrated system to deter the Brown Tree Snake from

Page 4, DEIS, Establishment and Operations of an ISR/Stike Capability

spreading throughout the region must be coordinated with these departments to increase the chances of success.

Thank you for the opportunity to comment.

Alejo D. Soto
ALEJANDRO D. SOTO
Acting

CC: Bureau of Statistics and Plans
Guam Waterworks Authority
Dept. of Agriculture, DAWR
Dept. of Parks & Recreation, Historic Preservation Office

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY****REGION IX****75 Hawthorne Street****San Francisco, CA 94105-3901**

A5

June 27, 2006

Mr. Jonathan Wald
Natural Resource Planner
Unit 14007
APO AP 96543-4007
Facsimile (671) 366-5088

Subject: Draft Environmental Impact Statement (DEIS), Establishment and Operation of an Intelligence, Surveillance, Reconnaissance (ISR), and Strike Capability, Anderson Air Force Base, Guam (CEQ # 20060173)

Dear Mr. Wald:

The U.S. Environmental Protection Agency (EPA) has reviewed the above-referenced document pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act. Our detailed comments are enclosed.

The Air Force proposes to locate the U.S. Pacific Command's ISR Strike capability, aerial refueling aircraft, and support personnel at Anderson Air Force Base (AFB) to increase response to adversaries' military or political objectives in Asia. Numerous facilities would be constructed as part of the proposed action, and the AFB population would increase by approximately 3000 personnel. The Air Force's preferred alternative is Alternative A.

A5-01

Based on our review, we have rated the DEIS as Environmental Concerns – Insufficient Information (EC-2) (see enclosed "Summary of Rating Definitions"). We have concerns regarding the project's proposal to substantially increase the amount of wastewater flowing to the Guam Waterworks Authority (GWA) Northern Wastewater Treatment Plant (WWTP). This WWTP is currently out of compliance with its National Pollutant Discharge Elimination System (NPDES) permit under existing conditions, and EPA is working with GWA on reissuing a permit that considers GWA's waiver from secondary wastewater treatment requirements under Section 301(h) of the Clean Water Act. The current waiver application does not include an increase in flow from Anderson AFB and the DEIS does not discuss the impact the proposed project would have on GWA's 301(h) renewal or efforts by that agency to come into compliance.

The Air Force must ensure that wastewater from the project is disposed of in a manner that does not violate water quality standards. We recommend the Air Force begin discussions with GWA regarding expansion needs for the Northern District WWTP, possibly to include an upgrade of this facility to secondary treatment if Clean Water Act Section 301(h) requirements and water quality standards cannot be met.

A5-02

Solid waste disposal at Anderson AFB is also a concern. It is not clear whether GovGuam will issue permits for the landfill expansion needed for the project, especially since it is located over a Sole Source Aquifer. More discussion is needed in the EIS to address aquifer contamination concerns and permitting limitations.

A5-03

In addition, EPA has concerns regarding the lack of a complete cumulative impacts assessment. We understand that full details for other Department of Defense projects are not yet known. However, the Air Force should attempt a cumulative impacts assessment based on information that is known and acknowledge the uncertainty, consistent with Council on Environmental Quality (CEQ) Guidance.

A5-04

Other concerns relate to noise impacts to residents, especially children, from the proposed project, and impacts to endangered species. We request additional information be included in the Final EIS regarding resource use by the needed 1,800 migrant construction laborers. We are also including suggestions for reducing impacts from the proposed project.

For all new development, EPA encourages the Air Force to commit to green building principles as outlined in Executive Order 13123 – Greening the Government through Efficient Energy Management and the recently executed “Federal Leadership in High Performance and Sustainable Buildings” Memorandum of Understanding.

EPA appreciates the opportunity to review this DEIS. When the Final EIS is released for public review, please send one copy to the address above (mail code: CED-2). If you have any questions, please contact me at (415) 972-3988 or Karen Vitulano, the lead reviewer for this project, at 415-947-4178 or vitulano.karen@epa.gov.

Sincerely,



Duane James, Manager
Environmental Review Office
Communities and Ecosystems Division

Enclosures: EPA's Detailed Comments
Summary of EPA Rating Definitions
Federal Leadership in High Performance and Sustainable Buildings MOU

cc: Earl Campbell, U.S. Fish and Wildlife Service
Adrienne Loerzel, Staff Assistant, Office of the Governor of Guam
Randel Sablan, Administrator, Guam Environmental Protection Agency
Mike Gawel, Chief Planner, Guam Environmental Protection Agency
David Craddick, General Manager, Guam Waterworks Authority

EPA DETAILED COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR ESTABLISHMENT AND OPERATION OF AN INTELLIGENCE, SURVEILLANCE, RECONNAISSANCE (ISR), AND STRIKE CAPABILITY, ANDERSON AIR FORCE BASE, GUAM, JUNE 26, 2006

Wastewater Treatment

The Guam Waterworks Authority (GWA) Northern District Wastewater Treatment Plant (WWTP) currently receives wastewater from Anderson AFB. According to the DEIS, the WWTP is currently operating at approximately 79% capacity (p. ES-6, 3-21) and the proposed action would increase this to 88% capacity (p. 4-34), and to 90% when considering other Anderson AFB projects (p. 4-44). The infrastructure impacts assessment does not include the wastewater that would be generated from the 1,800 migrant laborers required for the project (p. 4-89). If a construction camp of temporary housing is set up, wastewater would be transmitted to the GWA Northern District Wastewater Treatment Plant WWTP (p. 4-97).

The GWA Northern District WWTP is currently in a state of noncompliance with regard to its National Pollutant Discharge Elimination System (NPDES) permit and will need renovation to come into compliance. EPA is concerned that the Air Force is proposing a project that will increase flows to a noncompliant facility that does not currently meet water quality standards. The additional wastewater from the proposed action will put the Northern District WWTP near or at its design capacity and will impact its ability to achieve compliance with its NPDES permit.

EPA is currently working with GWA towards reissuing the NPDES permit. GWA is applying for renewal of its waiver from meeting secondary wastewater treatment requirements, per Clean Water Act Section 301(h). The current waiver application does not account for an increase in flow from Anderson AFB, however, and GWA would need to submit a new permit application for renewal of its Clean Water Act, Section 301(h) under the proposed project. Under existing conditions, EPA anticipates that GWA's Northern District WWTP NPDES permit would be reissued in 2007.

The increased wastewater flow from the proposed action could also affect the characteristics of the wastewater. While most of the increased flow is a result of additional personnel and therefore would be domestic in nature, there are elements of the project that could increase toxics loadings. Table 2.2-3 indicates a new UAV operations/maintenance facility, a wheel and tire shop, and a clean water rinse facility are part of Phase I of the proposed project. While oil/water separators would be added to these facilities, no information is provided regarding the existing or additional toxics loadings that would flow to the WWTP.

Additionally, we are concerned with the sewage backup problem identified in the DEIS, where the force main from the Back Gate Lift Station has caused raw sewage overflows into aquifer recharge injection wells (p. 4-41). There is no indication as to whether this problem has been remedied, if it is continuing, or if it will be addressed as part of the proposed action.

Recommendation:

- A5-05 | The Final Environmental Impact Statement (FEIS) should identify probable sewage disposal locations and calculate the amount of wastewater that would be generated by the migrant laborers required for the project. Include this estimate in the infrastructure impact analysis and update the percent capacity of the WWTP for the project and cumulative impact analysis accordingly.
- A5-06 | EPA requests that the FEIS identify what percentage of GWA's total flows originate from Anderson AFB, and how that percentage will change as a result of the proposed project.
- A5-07 | We also request a current volume estimate of toxic loadings for EPA's 126 priority pollutants and how that volume will change as a result of the proposed project.
- A5-08 | The FEIS should also include a review of GWA's draft Water Resources Master Plan for compatibility. We understand GWA currently has plans to upgrade its facility to incorporate redundancy into operations that will allow for maintenance activities. We are not aware that GWA plans to expand capacity for increased Anderson AFB flows. Because the project, combined with other Anderson AFB projects, will bring GWA's facility so close to capacity (> 90% if migrant laborer flows are included), we strongly recommend the Air Force and GWA meet to begin discussions on capacity expansion of the Northern District WWTP. These discussions should include the impact the increase wastewater flow will have on GWA's 301(h) permit renewal and whether upgrades to secondary wastewater treatment will be needed.
- A5-09 | In the short term, the Air Force should select Alternative B, which would lessen the increase in wastewater generation (a 38% increase as opposed to 57% increase under Alternative A) (p. 4-34, 4-39). The project should also include an upgrade or replacement
- A5-10 | of the collection system components that are causing raw sewage overflows into yards and the storm runoff system, and included in Table 2.2-3. In the FEIS, identify what
- A5-11 | action will be taken to ensure automatic overflow notifications to utilities personnel.

Cumulative Impacts Analysis

The cumulative impacts analysis for the DEIS included actions occurring on Anderson AFB only. The DEIS acknowledges that other DoD units have projects involving relocations to Guam, but that sufficient detailed information on those projects is not yet available to allow a detailed cumulative impacts assessment (p. ES-2). Instead, the cumulative impacts assessment for this project will be included in the Navy and Marine Corps NEPA documents when they are prepared.

While the levels of detail for these projects may be deficient, if the project is reasonably foreseeable, the Air Force should attempt a cumulative impacts assessment with the information known and acknowledge the uncertainty. The Council on Environmental Quality (CEQ) notes in its guidance document *Considering Cumulative Impacts under the National Environmental*

Policy Act that NEPA litigation¹ has made it clear that "reasonable forecasting" is implicit in NEPA and that it is the responsibility of federal agencies to predict the environmental effects of proposed actions before they are fully known. CEQ's regulations provide for including these uncertainties in the environmental impact assessment where the foreseeable future action is not planned in sufficient detail to permit complete analysis. Specifically, CEQ's regulations state:

"[w]hen an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, ...[that] cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, ...the agency shall include...the agency's evaluation of such impacts based on theoretical approaches or research methods generally accepted in the scientific community"(40 CFR 1502.22).²

Recommendation:

A5-12

Modify the cumulative impacts analyses to include a discussion of potential impacts from the Navy and Marine Corps projects planned for Guam. Utilize information in the DoD Master Plan for Guam, expected in July 2006, that will address military buildup and expansion activities. Where specific information is lacking, utilize general qualitative information and/or estimations based on information that is known. Similarly, include impacts that could be expected from the Air Force's electricity-generating wind turbines at Anderson AFB, especially in relation to birds and bats (p. 1-3), and impacts expected from the munitions storage igloos (p. 2-42). Include past actions to the extent they impacts resources, such as the existing level of habitat fragmentation.

A5-13

A5-14

Noise Impacts

The project will lead to additional noise exposure from the increase in number of operations by noisier ISR/Strike fighter and bomber aircraft (4-13). While the DEIS does not clearly identify at what level noise impacts would be considered significant, it cites a U.S. Environmental Protection Agency (EPA) report that identifies noise levels protective of public health and welfare (p. 4-16). EPA identifies a day-night average sound level (DNL) of 55 dBA (A-weighted sound level measured in decibels) as protective for sensitive areas including residences, schools and hospitals.

The noise impact analysis shows that 2,310 people off-base will be exposed to sound 65 dBA and above, with 552 potentially highly annoyed by the change (Table 4.1-4). This represents roughly ten times more people experiencing these impacts than at present. Table 4.1-2 shows that three data test points, numbers 1, 9, and 10, are off-base and could represent sensitive area exposures. All three of these areas would experience sound above 55 dBA under Alternative A. Alternative B would result in 16 fewer average daily aircraft operations, slightly reducing impacts.

¹ *Scientists' Institute for Public Information, Inc., v. Atomic Energy Commission* (481 F.2nd 1079 D.C. Cir. 1073)

² *Considering Cumulative Impacts under the National Environmental Policy Act*, Council on Environmental Quality, January 1997, p. 19-20

The greatest increase in noise is estimated to occur at an off-base school, with an increase from DNL 41 dBA to 62 dBA. Noise at an on-base school would also experience an increase in DNL to 62 dBA (p. 4-9). EPA is especially concerned with noise levels above the EPA-recommended DNL at schools (55 dBA), given that research on the effects of aircraft noise on student learning indicates interference with reading, motivation, language and speech, and memory (p. 4-12).

Recommendations:

- A5-15 | Identify significance criteria for the analysis of noise impacts in the FEIS. We
- A5-16 | recommend that EPA's recommended DNL of 55 dBA for residences, schools and
- A5-17 | hospitals be used. Estimate the DNL's for the 10 analysis points under Alternative B and
- A5-18 | include in Table 4.1-2. Commit to the following mitigation in the FEIS and Record of
- A5-19 | Decision (ROD):
- Retrofit all on- and off-based schools with appropriate measures to achieve the
new classroom acoustics standard of the American National Standards Institute
(ANSI) as identified on page 4-20. These mitigation measures could include
adding insulation, adding a second window pane or replacing windows with better
sound attenuation, sealing gaps or leaks in windows and doors, installing baffles
in vents and improving the exterior roofing, consistent with radon safety.
 - Construct all new schools on the AFB to the ANSI classroom acoustics standard.
Alternative A identifies at least one new high school. However, it appears that
additional schools will be needed to accommodate the cumulative effects of other
Anderson AFB projects. See comment under Infrastructure.
 - Provide a funding mechanism for off-base residences within the new 65+ dBA
noise contours under the project, to be used for noise reduction mitigation
measures identified above.

Biological Resources

Mariana fruit bat and Mariana crow

The last known roosting colony of the endangered Mariana fruit bat is located near Pati Point. The colony has fewer than 30 individuals, is declining steadily, and no juveniles are known to inhabit the colony. The invasive Brown Tree Snake (BTS) is the main cause of this decline. However, the substantial addition of aircraft flying over the colony from the proposed project is of concern. According to Table 4.5-5, it appears that aircraft events over Pati Point will increase from 2 flights per day to 53 flights per day (or from 110 to 169 per day, the table is unclear). In addition, the bat will also lose 142 acres of foraging habitat from the clearing of vegetation in the Aircraft Staging Area (ASA) and the Commercial Gate Area, 3.5 acres of which is considered higher quality and located in two areas of intact secondary forest (p. 4-65). There are less than 15 endangered Mariana crows on Guam (p. 3-51). The project will clear 142 acres of nesting habitat, 3.5 of which is considered most suitable (p. 3-52, 4-65), and aircraft operations and construction will be close to potential nesting sites of the Mariana crow (p. 4-73).

Since Mariana crows react negatively to aircraft overflight noise (p. 4-65), the increased noise of the project will impact the crow.

We assume the 3.5 acres identified as higher quality habitat for both the Mariana fruit bat and the endangered Mariana crow are within the Neisosperma-Macaranga Forest to the north as identified in Figure 3.5-1. This figure shows a perimeter road planned through a large section of this forest type, further fragmenting the forest and adjacent areas. Since the endangered Mariana crow prefers nesting in trees greater than 290 meters from roads, creating new road corridors through crow nesting habitat should be avoided.

Project impacts to these species, in the context of existing cumulative impacts, appear to be significant and we have considerable concerns regarding the ability of these species to withstand the burden of additional impacts. Additional efforts to minimize these impacts are appropriate.

Recommendations:

A5-20

We understand that the construction footprint has already been altered to reduce clearance in intact forest (p. 2-28). We are confident that Air Force planners have the skill to further adjust the footprint to protect the patches of higher quality habitat (totaling 3.5 acres), and to realign the road from a perimeter concept to one within the area already to be cleared for the ASA. The FEIS should also provide a map that identifies the locations of the 3.5 acres of higher quality forest.

A5-21

A5-22

The DEIS acknowledges that noise from overflights would affect Mariana fruit bat and Mariana crow recovery efforts (p. 4-69). The Air Force proposes an adaptive management strategy to address the uncertainties regarding noise impacts on these species, focusing on the fruit bat (p. 2-35), but little information is provided as to how this program will operate. The FEIS should provide more information regarding this strategy, preferably including the strategy as an attachment to the FEIS. At a minimum, the FEIS should identify the key elements of the adaptive management strategy including: monitoring objectives and timelines; information needs; needed financial, technical, and human resources; identities of responsible parties; the process for evaluating monitoring results including indicators and criteria; the process for altering management decisions; the data management process; and the process for communicating results.

In addition, we have the following recommendations to mitigate impacts to biological resources:

A5-23

- The DEIS makes clear the importance of preventing the spread of the BTS and notes that BTS control is a priority for the Department of Defense (DoD). The Air Force plans to carry out 100% inspection of out-bound craft and states that all aircraft, military or civilian, taking off from Anderson AFB will be inspected by the U.S. Department of Agriculture to the maximum extent possible. However, it does not indicate whether or how shipments that originated from Anderson AFB but depart from other ports will be inspected. The FEIS should identify how this control will occur, identify the appropriate funding levels needed to accomplish

this task, and indicate whether this funding will occur as part of the project.
Funding commitments should be included in the ROD.

- The DEIS suggests transplanting of *Tabernaemontana rotensis* seedlings and saplings (p. 2-30) but does not commit to this reforestation effort. We recommend this conservation measure be adopted and more detail, including locations, be provided in the FEIS. A clear commitment to its implementation should be included in the project ROD.
- A5-24 • The DEIS notes that the conservation measures identified for this project are sometimes the same as those already identified for the concurrent Northwest Field Training project previously analyzed in an Environmental Assessment. We recommend any conservation measures identified for the Northwest Field Training project also be included as mitigation measures in the ROD for this project. This would include the creation of a new Habitat Management Unit (HMU) for ecological studies.
- A5-25 • The preferred Alternative A includes development of 190 units of family housing. According to Figures 3.5-5 and 2.2-3, this housing would be located in the overlay refuge. We recommend Alternative B which avoids these impacts while still meeting the project purpose and need. If the Air Force selects Alternative A, we recommend relocating housing to an area within the existing developed footprint.

Other Infrastructure

Solid waste

The DEIS states that the AFB landfill will reach capacity in September 2007 (p. 3-23). GovGuam intends to have a new landfill in operation by September 2007 and Anderson AFB will use that landfill. If that project becomes delayed, Anderson AFB has a separate project that will expand the existing landfill by 2 acres and extend the lifespan of the landfill to 2009. If the GovGuam landfill does not become available, the Air Force plans to expand the landfill to serve beyond 2009 (p. 4-36).

We understand that the GovGuam landfill has become delayed. Therefore, the 2-acre expansion would be necessary. It is not clear whether GovGuam will issue permits for a landfill expansion project that is located over a Sole Source Aquifer, however. More discussion is needed to address aquifer contamination concerns and permitting limitations.

The DEIS references Anderson AFB's aggressive pollution prevention program and plans for recycling construction and demolition debris (p. 4-36), but does not mention efforts to recycle the increase in municipal solid waste from the additional 3000 personnel and the additional 1800 migrant laborers should they reside on-base. No info is provided about residential recycling programs, what materials are recycled, or what the current recycling rate is. It is not clear whether the current waste generation rate used in the impact analysis (2.5 lbs per person, p. 3-24) includes the recycling rate.

Recommendation:

A5-26

In the FEIS, provide an update on discussions with GovGuam regarding the landfill expansion. Indicate the likelihood of obtaining the necessary permits from GovGuam for a landfill expansion project on Anderson AFB to serve until 2009 and possibly beyond.

A5-27

Identify impacts to the Sole Source Aquifer from the existing and future landfill operations.

A5-28

Identify the probable disposal location for waste generated by the 1,800 migrant laborers, both on and off-base. Provide information on the existing residential recycling program

A5-29

including the current recycling rate. Indicate whether the waste generation rate includes

A5-30

recycling efforts. Identify what actions are needed to increase the recycling rate on the

A5-31

Base, and include waste diversion goals and timelines.

Water supply/groundwater recharge

The potable water at Anderson AFB is supplied by a system of 9 existing wells and 10 new wells under construction (p. 3-20). The proposed project would result in an increase in consumption of 51%, and combined with other projects on Anderson AFB, an increase of 83%. The impact analysis does not appear to include the water that will be consumed by the 1,800 migrant laborers that the project would require (p. 4-89) in either the project or cumulative impacts analyses. The document also does not indicate what water conservation measures are proposed for this substantial increase in water use on the Base.

The DEIS does not mention that the Northern Guam aquifer has been designated by EPA as a Sole Source Aquifer under the Safe Drinking Water Act (SDWA). As the sole source of drinking water, it is important to take measures to avoid contamination of the aquifer. As mentioned above, the raw sewage backup problem identified in the DEIS is a concern for groundwater contamination to the Sole Source Aquifer. Improvements to the wastewater collection system are not explicitly mentioned in the project list in Tables 2.2-3 and 2.2-4.

Recommendation:

A5-32

In the FEIS, include water consumption by the migrant labor force in the calculation of consumption for the project and in the cumulative impacts analysis. Identify water conservation measures and commit to their implementation in the ROD.

A5-33

Identify the Northern Guam aquifer as a Sole Source Aquifer and provide a brief description of this program. Discuss what actions are being taken to remedy the raw sewage overflows into the storm runoff collection basin and into injection wells leading to the aquifer.

A5-34

A5-35

Transportation

The DEIS includes a description of the roadway network but does not include a road map. It also indicates that the existing transportation system is adequate to meet present needs (p. 3-24) but it is not clear whether it will be adequate to meet the future cumulative demand, which would almost double the number of vehicles using Route 9 each day (p. 4-47). The DEIS mentions a

traffic study (p. 3-25) but no information is provided as to the existing level of service (LOS)³ at roadway segments or intersections. There is mention of short-term congestion, but no mitigation is included. Instead the document states that the congestion would be eliminated when the project activity is completed. Project activities are expected to occur over an 8-year period (p. 2-13).

Recommendation:

- A5-36. In the FEIS, provide a road map showing the routes and street names referenced in the Transportation section. Include more information, if known, regarding the existing LOS for applicable sections of Route 9 and key roadway segments and intersections within or leading to the Base. Estimate changes in LOS or impacts to Route 9 and indicate whether the current network is sufficient to meet future cumulative needs. Adopt mitigation measures to eliminate congestion during project construction. Mitigation should include the development of construction traffic and parking management plan that minimizes traffic interference and maintains traffic flow. Include this mitigation in the ROD.
- A5-37
- A5-38

Schools

The cumulative impacts of population increases from this and other projects on Anderson AFB will result in the need for additional schools. The list of projects associated with the preferred alternative only includes a new high school (Tables 2.2-3 and 2.2-4). The DEIS states that the elementary and middle school system has just over 200 vacancies, but the cumulative projects will require vacancies in these schools for over 725 students (p. 4-99).

Recommendation:

- A5-39 The scope of the EIS should include the analysis of impacts from all connected actions (40 CFR 1508.25). In the FEIS, identify all necessary school facility expansions, include these expansions in Tables 2.2-3 and 2.2-4 and Figures 2.2-3 and 2.2-4, and analyze the environmental impacts from these actions.

Air Quality

Diesel Emissions / Construction Emissions Mitigation

The DEIS discusses and quantifies expected construction and operational emissions for the project and for other projects on Anderson AFB. The DEIS does not discuss health impacts from diesel emissions or hazardous air pollutants (air toxics) associated with the project.

Emissions from diesel engines found in trucks and construction equipment contain tiny particles known as "diesel particulate matter" (DPM) which can create serious health problems for adults and have extremely harmful effects on children and the elderly. Children are especially adversely affected by diesel emissions because their respiratory systems are still developing and they have a faster breathing rate. Diesel exhaust also contains ozone-forming nitrogen oxides and toxic air

³ Refers to a standard measurement used by transportation officials which reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions rated as LOS-F.

pollutants. Diesel exhaust is classified by EPA as a "likely" human carcinogen at environmental exposure levels (*Health Assessment Document for Diesel Engine Exhaust*, EPA 2002). Exposure to diesel exhaust may contribute to respiratory irritation and lung damage. The DBIS does not contain mitigation measures that would reduce impacts to air quality and human health from the construction phase of the project.

Recommendation:

A5-40

The FEIS should disclose the available information about the health risks associated with DPM and mobile source air toxics (see <http://www.epa.gov/otaq/toxics.htm>).

A5-41

EPA recommends including a Construction Emissions Mitigation Plan (CEMP) in the FEIS and adopting this plan in the ROD. EPA recommends the following mitigation measures be included in the CEMP:

- Reduce emissions of DPM and other air pollutants by using particle traps and other technological or operational methods.
- Employ periodic unscheduled inspections to ensure that diesel-powered construction equipment is properly tuned and maintained and shut off when not in direct use. Ensure construction equipment is not modified to increase horsepower except in accordance with established specifications. Develop and enforce an anti-idling policy at the construction site.
- Locate diesel engines, motors, and equipment staging areas as far as possible from residential areas and sensitive receptors (schools, senior centers, daycare centers, etc.). Route construction vehicles away from these receptors.
- Require low sulfur diesel fuel (<15 parts per million sulfur), if available.
- Reduce construction-related trips of workers and equipment, including trucks.
- Lease or buy newer, cleaner equipment (1996 or newer model), using a minimum of 75 percent of the equipment's total horsepower.
- Use engine types such as electric, liquified gas, hydrogen fuel cells, and/or alternative diesel formulations.

Federal Leadership in Sustainable Building

The project involves substantial new construction of facilities. There is no mention of the Executive Order (E.O.) 13123 – Greening the Government through Efficient Energy Management (p. 2-19) which supports energy efficiency, water conservation, and the use of renewable energy products by the federal government, providing specific goals towards these ends. Section 102 of E.O. 13123 states that each agency shall expand their use of renewable energy and shall strive to install 20,000 solar energy systems by 2010. Section 207 of E.O. 13123 also references water conservation goals.

In addition to E.O. 13123, on January 24, 2006, numerous federal agencies, including the DoD, signed the Memorandum of Understanding (MOU) entitled "Federal Leadership in High Performance and Sustainable Buildings", in which these agencies committed to design, construct and operate their facilities in an energy-efficient and sustainable manner. Through the MOU, the DoD agreed to: reduce the energy cost budget by 30% for new construction and 20% for major renovations; employ strategies to reduce indoor and outdoor water use and reduce stormwater runoff and pollution; use products with recycled content; and use biobased products made from rapidly renewable resources and certified sustainable wood products.

Recommendation:

A5-42 | The Air Force should ensure the goals of E.O. 13123 and the MOU for high performance and sustainable buildings are followed for all new construction. The FEIS should:

- identify the goals for energy and resource savings for the projects as specified above,
- include a commitment to utilize solar energy and indicate the number of where solar energy systems that will be employed,
- identify goals and methods to reduce indoor and outdoor water as specified in the MOU, and
- include the commitment to use recycled products and certified sustainable wood products.

These commitments should be specified in all contracts and documented in the FEIS and the ROD.

SUMMARY OF EPA RATING DEFINITIONS

This rating system was developed as a means to summarize EPA's level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the EIS.

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

ADEQUACY OF THE IMPACT STATEMENT

Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

FEDERAL LEADERSHIP IN HIGH PERFORMANCE AND SUSTAINABLE BUILDINGS

MEMORANDUM OF UNDERSTANDING

PURPOSE:

With this Memorandum of Understanding (MOU), signatory agencies commit to Federal leadership in the design, construction, and operation of High-Performance and Sustainable Buildings. A major element of this strategy is the implementation of common strategies for planning, acquiring, siting, designing, building, operating, and maintaining High Performance and Sustainable Buildings. The signatory agencies will also coordinate with complementary efforts in the private and public sectors.

BACKGROUND AND FEDERAL POLICY:

The Federal Government owns approximately 445,000 buildings with total floor space of over 3.0 billion square feet, in addition to leasing an additional 57,000 buildings comprising 374 million square feet of floor space. These structures and their sites affect our natural environment, our economy, and the productivity and health of the workers and visitors that use these buildings.

Therefore, the Federal Government is committed to designing, locating, constructing, maintaining, and operating its facilities in an energy efficient and sustainable manner that strives to achieve a balance that will realize high standards of living, wider sharing of life's amenities, maximum attainable reuse and recycling of depletable resources, in an economically viable manner, consistent with Department and agency missions. In doing so and where appropriate, we encourage the use of life cycle concepts, consensus-based standards, and performance measurement and verification methods that utilize good science, and lead to sustainable buildings.

GOALS AND OBJECTIVES OF THIS MOU

Consistent with and in addition to Federal policy, statutes, executive orders and supplemental agency policies and guidance, the Parties to this MOU collaboratively seek to establish and follow a common set of sustainable Guiding Principles (attached) for integrated design, energy performance, water conservation, indoor environmental quality, and materials aimed at helping Federal agencies and organizations:

- Reduce the total ownership cost of facilities;
- Improve energy efficiency and water conservation;
- Provide safe, healthy, and productive built environments; and,
- Promote sustainable environmental stewardship.

OTHER LAWS AND MATTERS: This MOU is for internal management purposes of the Parties involved. It is not legally enforceable and shall not be construed to create any legal obligation on the part of any of the signatories. This MOU shall not be construed to

provide a private right or cause of action for or by any person or entity. This MOU in no way restricts the Parties from participating in any activity with other public or private agencies, organizations or individuals.

The Parties mutually recognize and acknowledge that MOU implementation will be subject to financial, technical, and other mission-related considerations. It is not intended to create any rights, benefits, or trust responsibilities, either substantive or procedural, nor is it enforceable in law by a party against the U.S., its agencies, its officers, or any other person.

Collaboration under this MOU will be in accordance with applicable statutes and regulations governing the respective Parties. Nothing in this MOU is intended to affect existing obligations or other agreements of the Parties.

EFFECTIVE PERIOD: This MOU will become effective upon signature. It shall remain in effect unless otherwise modified or terminated. Any party may withdraw upon 30 days written notification to the others.

MODIFICATIONS: This MOU can be modified through mutual written agreement among the Parties,

ADMINISTRATION: Agencies will strive to incorporate and adopt, as appropriate and practical, the attached *Guiding Principles* into existing agency policy and guidance within 180 days of signature. To assist with this effort, the Interagency Sustainability Working Group (ISWG) will provide technical guidance and updates for the *Guiding Principles*.

The Office of Federal Environmental Executive will work with the ISWG and Federal Green Building Council to develop methods of reporting on progress towards this MOU in a manner that is least burdensome to the agencies. This may include incorporating reporting into existing mechanisms, such as executive order reports; but in any case with a goal of avoiding a separate reporting process.

**GUIDING PRINCIPLES
FOR
FEDERAL LEADERSHIP IN HIGH PERFORMANCE AND SUSTAINABLE
BUILDINGS**

I. EMPLOY INTEGRATED DESIGN PRINCIPLES

Integrated Design. Use a collaborative, integrated planning and design process that:

- Initiates and maintains an integrated project team in all stages of a project's planning and delivery;
- Establishes performance goals for siting, energy, water, materials, and indoor environmental quality along with other comprehensive design goals, and, ensures incorporation of these goals throughout the design and lifecycle of the building; and,
- Considers all stages of the building's lifecycle, including deconstruction.

Commissioning. Employ total building commissioning practices tailored to the size and complexity of the building and its system components in order to verify performance of building components and systems and help ensure that design requirements are met. This should include a designated commissioning authority, inclusion of commissioning requirements in construction documents, a commissioning plan, verification of the installation and performance of systems to be commissioned, and a commissioning report.

II. OPTIMIZE ENERGY PERFORMANCE

Energy Efficiency. Establish a whole building performance target that takes into account the intended use, occupancy, operations, plug loads, other energy demands, and design to earn the Energy Star® targets for new construction and major renovation where applicable. For new construction, reduce the energy cost budget by 30 percent compared to the baseline building performance rating per American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., (ASHRAE) and the Illuminating Engineering Society of North America (IESNA) Standard 90.1-2004, Energy Standard for Buildings Except Low-Rise Residential. For major renovations, reduce the energy cost budget by 20 percent below pre-renovations 2003 baseline.

Measurement and Verification. In accordance with DOE guidelines issued under section 103 of the Energy Policy Act of 2005 (EPAAct), install building level utility meters in new major construction and renovation projects to track and continuously optimize performance. Compare actual performance data from the first year of operation with the energy design target. After one year of occupancy, measure all

new major installations using the Energy Star® Benchmarking Tool for building and space types covered by Energy Star®. Enter data and lessons learned from sustainable buildings into the High Performance Buildings Database. (www.eere.energy.gov/femp/highperformance/index.cfm)

III. PROTECT AND CONSERVE WATER

Indoor Water. Employ strategies that in aggregate use a minimum of 20 percent less potable water than the indoor water use baseline calculated for the building, after meeting the Energy Policy Act of 1992 fixture performance requirements.

Outdoor Water. Use water efficient landscape and irrigation strategies, including water reuse and recycling, to reduce outdoor potable water consumption by a minimum of 50 percent over that consumed by conventional means (plant species and plant densities). Employ design and construction strategies that reduce storm water runoff and polluted site water runoff.

IV. ENHANCE INDOOR ENVIRONMENTAL QUALITY

Ventilation and Thermal Comfort. Meet the current ASHRAE Standard 55-2004, Thermal Environmental Conditions for Human Occupancy, including continuous humidity control within established ranges per climate zone, and ASHRAE Standard 62-2004, Ventilation for Acceptable Indoor Air Quality.

Moisture Control. Establish and implement a moisture control strategy for controlling moisture flows and condensation to prevent building damage and mold contamination.

Daylighting. Achieve a minimum of daylight factor of 2 percent (excluding all direct sunlight penetration) in 75 percent of all space occupied for critical visual tasks. Provide automatic dimming controls or accessible manual lighting controls, and appropriate glare control.

Low-Emitting Materials. Specify materials and products with low pollutant emissions, including adhesives, sealants, paints, carpet systems, and furnishings.

Protect Indoor Air Quality during Construction. Follow the recommended approach of the Sheet Metal and Air Conditioning Contractor's National Association Indoor Air Quality Guidelines for Occupied Buildings under Construction, 1995. After construction and prior to occupancy, conduct a minimum 72-hour flush-out with maximum outdoor air consistent with achieving relative humidity no greater than 60 percent. After occupancy, continue flush-out as necessary to minimize exposure to contaminants from new building materials.

V. REDUCE ENVIRONMENTAL IMPACT OF MATERIALS

Recycled Content. For EPA-designated products, use products meeting or exceeding EPA's recycled content recommendations. For other products, use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10 percent (based on cost) of the total value of the materials in the project.

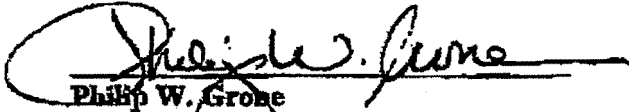
Biobased Content. For USDA-designated products, use products meeting or exceeding USDA's biobased content recommendations. For other products, use biobased products made from rapidly renewable resources and certified sustainable wood products.

Construction Waste. During a project's planning stage, identify local recycling and salvage operations that could process site related waste. Program the design to recycle or salvage at least 50 percent construction, demolition and land clearing waste, excluding soil, where markets or on-site recycling opportunities exist.

Ozone Depleting Compounds. Eliminate the use of ozone depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with either the Montreal Protocol and Title VI of the Clean Air Act Amendments of 1990, or equivalent overall climate change benefits that take into account life cycle impacts.

SIGNATORIES

The undersigned individuals hereby execute this MOU on behalf of their respective agencies. The Parties envision that other Federal agencies may wish to join this MOU. The Parties encourage all Federal agencies that support the MOU goals and objectives to do so by signing the MOU and applying the *Guiding Principles*.




Philip W. Grose
Deputy Under Secretary of Defense for Installations and
Environment
Department of Defense

24 January 2006
Date



Douglas L. Faulkner
Acting Assistant Secretary for Energy Efficiency
and Renewable Energy
Department of Energy

24 January 06
Date



David L. Winstead
Commissioner, Public Buildings Service
General Services Administration

24 January '06
Date

Robert J. Henke
Assistant Secretary for Management
Office of Management
Department of Veterans Affairs

Date



P. Lynn Scarlett
Deputy Secretary
Department of the Interior

1-25-06

Date



Ronald L. Deacon
Director, Facilities and Administrative Services
Department of Justice

1-24-2006

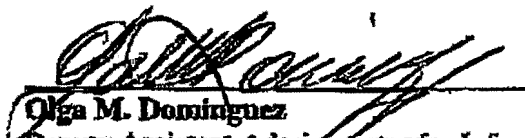
Date



Thomas C. Dorr
Under Secretary for Rural Development
Department of Agriculture

1-23-2006

Date



Olga M. Dominguez
Deputy Assistant Administrator for Infrastructure
and Administration
National Aeronautics and Space Administration

1/23/2006


Date



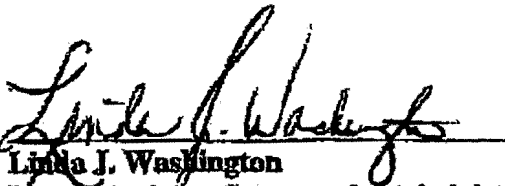
Donald Bathurst
Chief Administrative Services Officer
Department of Homeland Security

1/24/2006

Date


William C. Stamper
Deputy Assistant Secretary
Office for Facilities Management & Policy
Department of Health and Human Services


1/24/06
Date


Linda J. Washington
Deputy Assistant Secretary for Administration,
Department of Transportation

1/24/06
Date

John E. Long, Jr.
Executive Vice President, Administrative Services
Tennessee Valley Authority

Date



Luis A. Luna
Assistant Administrator
Administration And Resources Management
Environmental Protection Agency

1/24/06
Date

Henrietta H. Fore
Under Secretary of State for Management
Department of State

Date

2-6-06
Date


John E. Long, Jr.
Executive Vice President, Administrative Services
Tennessee Valley Authority



General Charles E. Williams
Director/COO
Overseas Buildings Operations
Department of State

Date



Frank J. Coulter, Jr.
Deputy Assistant Secretary
Representing the Agency Environmental Executive
Department of State

1-24-06

Date

Keith Nelson
Assistant Secretary of Administration
Department of Housing and Urban Development

Date



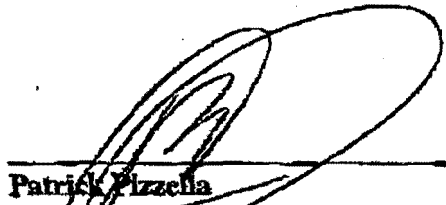
Ronald C. Flom
Associate Director, Management Services Division
Office of Personnel Management

1/24/06

Date

Bryan Hannegan
Chief of Staff,
Council on Environmental Quality
Executive Office of the President

Date



Patrick Pizzella
Assistant Secretary for Administration and Management,
Environmental Executive
Department of Labor

2/2/06
Date

A6

**United States Department of the Interior**

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
1111 Jackson Street, Suite 520
Oakland, CA 94607

June 30, 2006

ER# 06/583

Mr. Scott Whittaker
Environmental Flight Chief
Unit 14007
APO, AP 96543-4007

Subject: Review of Draft Environmental Impact Statement (EIS) for Establishment and Operation of an Intelligence, Surveillance, and Reconnaissance and Strike Capability, Andersen Air Force Base, Guam

Dear Mr. Wald:

The Department of the Interior (Department), has reviewed the U.S. Air Force's (USAF) April 2006 Draft Environmental Impact Statement (DEIS) for the Proposed Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability (ISR/Strike) at Andersen Air Force Base (Andersen), Guam.

The DEIS states the proposed project will have no adverse impacts on threatened and endangered species, including habitat deemed essential to the recovery of the endangered Mariana crow (*Corvus kubaryi*), Guam rail (*Gallirallus owstoni*), Guam Micronesian kingfisher (*Halcyon cinnamomina cinnamomina*), and *Serianthes nelsonii* and the threatened Mariana fruit bat (*Pteropus mariannus mariannus*).

The Department, through the Fish and Wildlife Service (Service) is currently in section 7 consultation with the USAF on the proposed ISR/Strike project and will address project-specific impacts to federally listed species under separate cover.

This letter has been prepared under the authority of and in accordance with provisions of the National Environmental Policy Act of 1969 [42 U.S.C 4321 *et seq.*; 83 Stat. 852], as amended (NEPA), technical advice for the Endangered Species Act of 1973 [16 U.S.C 1531 *et seq.*; 87 Stat. 884], as amended, and other authorities mandating concern over environmental values.

Based on these authorities, we offer the following comments for your consideration.

A6-01

Overall, the Department is concerned the DEIS has not fully addressed all cumulative impacts to federally listed species and their habitat. Although the USAF has proposed various adaptive management techniques and conservation measures to help reduce project impacts, it is not clear that all potential direct and indirect impacts to listed species are offset.

A6-02

In addition, the Department suggests the proposed Andersen Brown Treesnake Control Plan (Plan) and conservation measures address and incorporate the Department's concerns and recommendations for the final EIS (FEIS).

GENERAL COMMENTS

Brown treesnakes

The Department appreciates the USAF's positive steps toward brown treesnake (*Boiga irregularis*) interdiction through the Plan. The Department is seeking assurance that the USAF is proposing in their DEIS to consistently sustain 100 percent inspection rate of all cargo, vehicles, munitions, household goods and other items departing Guam from Andersen or other sites off-base on Guam, where USAF materials, goods, vehicles, and cargo are staged for departure from Guam in the FEIS.

A6-03

Support for brown treesnake quarantine efforts by United States Department of Agriculture - Wildlife Services (DOAWS) should be based on the staff levels required to maintain programmatic integrity during peak periods of cargo and vehicle movement off Guam. The proposed action for Andersen should adequately support sustained brown treesnake trapping, capture, and toxicant use by DOAWS in the vicinity of sites where Andersen cargo, munitions, vehicles, and other items are staged, stored, or packed prior to departing Guam.

A6-04

The Department strongly recommends a mechanism be cooperatively developed by the USAF, DOAWS, and the Service that estimates the cost for DOAWS brown treesnake interdiction efforts at 100 percent level on Andersen, 18 months in advance. The Service recommends that the DEIS describe in detail funding mechanism and assurances for future interdisciplinary efforts. The importance of long-term adequate and consistent office and kennel space for DOAWS brown treesnake interdiction efforts on Andersen is essential.

A6-05

Efforts should be made to identify and secure space for greater than a five year period. To ensure that the orders to inspect cargo meet the Department of Defense's (DOD) Defense Transportation Regulation, we recommend that regulation protocols 505 and 506 be incorporated into the Plan and in appendix to the FEIS document.

A6-06

The Department also recommends that DOD provide sustained base funding for applied brown treesnake research efforts by the DOAWS - National Wildlife Research Center

(NWRC), as mitigation for proposed USAF expansion and cumulative effects of DOD expansion on Guam.

The applied research efforts funded by DOD should focus on: 1) developing aerial broadcast techniques for snake toxicants; 2) development of artificial lures and attractants for brown treesnakes; 3) the development of more cost-effective strategies to control or eliminate brown treesnakes from quarantine and field situations; and 4) the detection and capture of brown treesnakes at low densities.

A6-07

The Department suggests the research scope and direction of NWRC efforts be determined by DOD, DOSWS Operations, NWRC, and Service staff through annual and multi-year goals with discrete, finite goals. It should be emphasized that development and implementation of the aforementioned research goals will increase effectiveness of the interdiction program, support large-scale control programs for listed species, like the proposed control program at Pati Point (see *Proposed Conservation Measures* below for additional information), and will ultimately reduce cost while increasing geographic scale of brown treesnake control on Guam.

Proposed Conservation Measures

The USAF is proposing to create and manage two ungulate exclosures totaling approximately 200 hectares (494 acres) to facilitate forest regeneration and offset direct loss of approximately 74 hectares (184 acres) of habitat for the Mariana fruit bat, Mariana crow, Guam Rail, and Guam Micronesian kingfisher.

The scale and scope of this proposed mitigation may not be sufficient to offset potential indirect loss of habitat adjacent to proposed aircraft staging area, commercial gate, and truck inspection area due to human disturbance. For example, increased aircraft noise levels and human activity at proposed aircraft staging area may limit use of the forest adjacent to this facility by foraging and breeding Mariana crows and Mariana fruit bats.

A6-08

This will, in turn, reduce total area available on Andersen to support a sustainable Mariana crow and Mariana fruit bat population. Therefore, the Department recommends USAF consider offsetting any indirect loss of habitat, in addition to direct habitat loss, as part of proposed conservation measures in the FEIS. These impacts could be offset by setting aside additional land for habitat enhancement through ungulate eradication, and brown treesnake control.

The USAF is also proposing to control brown treesnakes at the Mariana fruit bat colony at Pati Point. Though the ultimate goal of this proposed effort will be beneficial, the Department is concerned about the level of disturbance this effort may cause to the Mariana fruit bat colony.

The Mariana fruit bat colony is highly susceptible to human disturbance, due to poaching pressure, and the available brown treesnake control measures now set up and maintained

by personnel. We are very concerned that brown treesnake control measures cannot be placed at effective distances from the bat colony without causing disturbance to individuals in the colony.

A6-09

The Department suggests that new control techniques be developed for brown treesnake control at the bat colony (e.g., aerial broadcast of snake bait, and development of new bait types), and included in USAF's proposed conservation measures in the FEIS, to help ensure benefits to the Mariana fruit bat population.

A6-10

The Department, through the USFWS, would like to provide assistance assist development of these new techniques. The Department recommends USAF include as part of their project, the ultimate goal of increasing juvenile bat survival and recruitment through brown treesnake control. Currently, the proposed project focuses only on the immediate goal of reducing snake numbers in the area and not the ultimate goal of promoting recruitment in the bat population.

The USAF has also proposed in their DEIS to complete a study on effects of aircraft noise on Mariana fruit bats and Mariana crows and to use data from this study to modify aircraft ground track locations, airspeed, and/or altitude to potentially avoid or minimize impacts to these species.

The Department agrees these measures are important, however, there may not be enough information to assume these measures would be effective. For example, the Mariana fruit bat colony could abandon the Pati Point site if aircraft disturbance (noise levels and frequency) reaches an unacceptable level to individuals in the colony. This may cause the colony to move to a site that increases its exposure to poaching. If the colony abandons the Pati Point site, modifying aircraft flight operations would likely provide little benefit to the species.

A6-11

Therefore, the Department recommends USAF also consider potential impact of bats abandoning the Pati Point colony site in the FEIS, and develop appropriate measures, including offsite mitigation, to offset this impact if it occurs. As stated in the DEIS, the majority of the Mariana fruit bat population on Guam is located at the Pati Point site. The abandonment of this site and its potential impact on the colony members could determine the fate of the Guam population.

A6-12

In addition to impacts to resident population of bats, the Department recommends USAF consider impact of flight operations on Mariana fruit bats that may have migrated to Guam from Rota temporarily due to typhoon and/or poaching events on Rota.

A6-13

Recent survey work on Rota and Guam indicates the Pati Point colony can increase by approximately 100 individuals after a typhoon event on Rota (Esselystyn, Amar, and Janeke, in press). These bats may not have habituated to aircraft disturbance and may return to Rota, which could increase their exposure to poaching pressure or limited food resources, or move to areas on Guam that may increase their exposure to poaching and other impacts.

A6-13
(...continued)

Adaptive management of flight operations may minimize these impacts but USAF should be prepared to implement other appropriate measures to offset these impacts if modification of flight operations is not successful. Currently, the Rota and Guam subpopulations of Mariana fruit bats make up approximately 30 to 40 percent of the total population throughout the Mariana archipelago and constitute the only significant group of bats in the southern Mariana Islands (Saipan through Guam).

The DEIS proposed to develop an ungulate control plan, vegetation surveys, and outplanting of foraging trees for Mariana crows and Mariana fruit bats. These measures are positive steps toward long-term conservation of listed species on Guam and we recommend these efforts be integrated and included under a base-wide effort to support conservation programs for these species. This effort would not only include habitat restoration and control of feral ungulates, cats, and dogs, but should also include large-scale brown treesnake control and continued support for reintroduction programs for listed species.

A6-14

One of the goals of the 1994 cooperative agreement between USAF and the Department, through the Service, for the establishment and management of the Guam National Wildlife Refuge, is to develop a long-term, comprehensive program to conserve and recover federally endangered and threatened species. Please indicate in the FEIS how your agency will utilize this agreement to further implement your natural resource conservation goals related to the proposed action.

A6-15

The Government of Guam's Division of Aquatic and Wildlife Resources (GDAWR) is the primary agency working in the field on the recovery of federally threatened and endangered species under the Department's section 6 Service grants. Please indicate in the FEIS how proposed USAF conservation measures would be integrated with existing and future activities of GDAWR and actions by other natural resource management and research entities.

The Department would like to emphasize how important proposed conservation measures in the FEIS are for their Trust Resources and would like these measures to be adequately supported in a manner that ensures that conservation benefits to federally threatened and endangered species can occur. In particular, proposed ungulate exclosures would only be effective for species recovery if the ultimate goal of this activity is clearly stated as eradication, from the onset. Ungulate eradication would require a professionally designed plan for implementation.

A6-16

The Department suggests that professional outside expertise be utilized to write and implement a plan. Reliance on volunteer hunters (e.g., Andersen Conservation Officers) to conduct ungulate eradication efforts in enclosures of the size proposed have typically been unsuccessful. Please consider proposing for the FEIS some of the newer ungulate controls for conservation measures such as the "Super Sow."

By continually cycling a radio-collared female through estrus in order to attract males, the sow acts as a bait mechanism allowing for lethal control of attracted males. This technology is advancing significantly and implementation helps to ensure the goal of ungulate eradication is achieved quickly in a cost-effective manner.

Successfully removing ungulates and maintaining proposed ungulate exclosures will require a long-term investment in this proposed conservation measure.

The Department commends the DOD for establishment of the "experimental" Habitat Management Unit (HMU) by USAF. This action is a significant step forward for natural resource management on Andersen. Please include in the FEIS, "the goal of the HMU is to create a 165-acre snake exclosure using a typhoon-proof snake barrier."

We note that in the DEIS (Chapter 2, page 57) the HMU is incorrectly identified as a 69-acre site. Please ensure that the FEIS identifies the source for funding for completion of the snake barrier around the 169-acre site. The fence should be designed so it can be retrofitted to reduce cat and deer movement at a later date. An existing snake exclosure (Figure 2.2-7) of similar height has significantly reduced deer foraging on understory vegetation and has been very successful at stopping pig foraging on vegetation.

Cumulative impacts on federally-listed endangered species

Estimates in the DEIS for cumulative loss of habitat do not take into full account all direct and indirect project-related impacts. USAF's September 2005 Biological Assessment for proposed Munitions Storage Area (MSA) Igloo Construction project indicates that approximately one hectare will be cleared for first phase of the proposed project and an additional seven to nine hectares may be cleared for second phase. Only vegetation cleared for first phase of the project is discussed in the DEIS.

USAF estimated approximately 48 hectares would be cleared for Northwest Field Beddown project (Beddown project). However, the March 2006 draft Environmental Assessment (EA) for Beddown project estimated 54 hectares of preferred, and 137 hectares of suitable Mariana crow and Mariana fruit bat habitat, would be subject to intense training events during the proposed Beddown project.

Increased training activity could preclude Mariana fruit bats and Mariana crows from this area, thus reducing availability of suitable habitat to support their eventual recovery. Also, as previously mentioned, indirect habitat loss due to human activity and aircraft noise may also occur in proposed ISR/Strike.

Therefore, the Department recommends areas proposed for clearing during second phase of the MSA Igloo project and areas subject to disturbance associated with training in the Northwest Field and ISR/Strike (e.g., forest adjacent to the proposed aircraft staging area under proposed ISR/Strike) be assessed in the cumulative impacts of the FEIS, and appropriately mitigated.

Cumulative loss of habitat would determine whether remaining forest in northern Guam would be sufficient to support recovery of federally listed species. For example, recovery criteria for the Guam Micronesian kingfisher calls for 1,000 individuals in northern Guam. Average territory size estimates of Pohnpei Micronesian kingfishers indicate that approximately 10 hectares are needed to support a pair.

Therefore, the Department estimates approximately 5,000 hectares of kingfisher habitat are needed to support this population.

The Department is also aware from the August 2005 draft EA for the MSA Igloos project, that current storage capacity of the MSA is not adequate to support current operations on Andersen. The proposed ISR/Strike is intended to increase the number of aircraft stationed or rotated to the base. The DEIS also indicates that aircrew training, potentially involving munitions, may also be needed for aircrews rotated to Andersen.

A6-19 | This combined information seems to imply that munitions storage capacity of Andersen may need to be increased. The Department recommends that any potential increases in munitions capacity at Andersen, due to the proposed ISR/Strike and resulting impacts on federally listed species, be addressed in the FEIS.

SPECIFIC COMMENTS

A6-20 | Page 1-3 Past, Present, and Reasonable Foreseeable Future Actions: The Department recommends USAF also evaluate all potential actions by Federal agencies in the FEIS. For example, Army Corps of Engineers is reviewing a permit to build an access road to the Jinapsen Beach area from Tarague Beach. Please include these types of actions in the FEIS analysis as they have cumulative potential to impact natural resources in northern Guam.

A6-21 | Page 2-41, Table 2.4-1: The Department recommends additional information about location of proposed Combat Arms Training and Maintenance Facility be included in the FEIS. Currently the location of this project is not indicated in any figures included in this section of the DEIS and it is not possible to evaluate its potential impact on biological resources. If this facility is expected to have impacts on biological resources (e.g., vegetation clearing and weapons training noise), we recommend it be addressed in the FEIS.

A6-22 | Page 2-58, Section 2.4.3: The Department recommends additional information about Transportable Airlift Control Element Unit and Logistics Unit should be included in the FEIS. The DEIS provides information on the number of personnel and states no construction will occur, but does not provide information on whether operations or training associated with this unit will impact biological resources. For example, please provide information on whether training for the Airlift Unit requires transport of goods from Guam to other areas or if it occurs in the northwest field area of Andersen.

Operation and training associated with these units may have impacts on biological resources on Guam and brown treesnake interdiction efforts that may need to be addressed.

A6-23

Page 3-50, Line 24-25: Prior to 2005, only the Mariana fruit bat population on Guam was federally listed. The statement that the population in the Commonwealth of the Northern Mariana Islands was listed as threatened when the Guam population was listed as endangered is incorrect. Please correct for the FEIS.

A6-24

Page 3-52, Line 38-39: The Guam Micronesian kingfisher was recorded along the survey transect (transect nine) next to proposed aircraft staging area in 1981; therefore kingfishers likely utilized vegetation proposed for clearing in the project area. If USAF is defining this area as Andersen main, then the statement about kingfishers not being present in 1981 is incorrect. Please correct for the FEIS.

A6-25

Page 4-59, Table 4.5-4: Estimated Mariana crow suitable habitat that would be cleared is presented as approximately half the amount of suitable Mariana fruit bat habitat, even though they both include the same vegetation types. The Department estimates suitable Mariana crow habitat should be equal to the current estimate of suitable Mariana fruit bat habitat in the FEIS.

A6-26

Page 4-61, Lines 25-29: Assessment of project impacts on Mariana fruit bat habitat does not include that of indirect habitat loss due to human disturbance activities. Forested areas adjacent to proposed aircraft staging area would be exposed to human activity that may limit potential of these forests to support long-term conservation of the Mariana fruit bat. The Department recommends these indirect impacts and associated acreage should also be included in the assessment on potential habitat loss for this species.

A6-27

Page 4-62, Lines 11-15: Bats in the genus *Rousettus*, like *Rousettus aegyptiacus*, are the only megachiropterans that use echolocation to find food. Therefore, hearing sensitivity of this genus may not be applicable to hearing sensitivity of the Mariana fruit bat, which may be more sensitive to acoustic energy of aircraft (below 2 kilohertz). The biological resources section of Table 4.13-1 (page 4-113) states that much of acoustics associated with aircraft noise is below 2 kilohertz, implying it may not affect Mariana fruit bats. There is no evidence to support this assumption and it should be removed in the FEIS.

A6-28

Page 4-65, Lines 22-34: Assessment of project impacts on Mariana crow habitat does not include assessment of indirect habitat loss due to human disturbance activities. Forested areas adjacent to proposed aircraft staging area would be exposed to human activity, including aircraft noise that may limit potential of these forests to support long-term conservation of the Mariana crow. These indirect impacts and associated acreage should also be included in the assessment on potential habitat loss for this species for the FEIS.

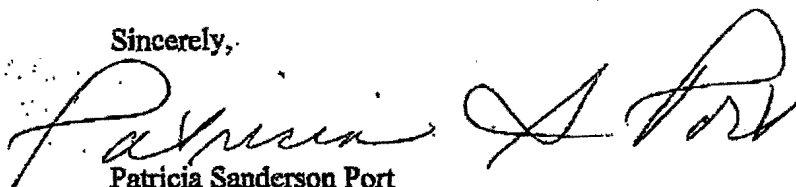
A6-29

Page 4-67, Lines 30-34: Assessment of project impacts on the Guam Micronesian kingfisher does not include an assessment of loss of habitat needed to support recovery of the species on Guam. The DEIS only states that habitat within the MSA, a proposed

reintroduction site, would not be impacted by the proposed project. USAF should consider effects of direct and indirect habitat loss on long-term conservation of the Guam Micronesian kingfisher for the FEIS.

The Department appreciates the opportunity to comment on the DEIS for the Proposed Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability on Andersen. If you have any questions regarding these comments, please contact Fish and Wildlife Biologist Fred Amidon at (808) 792-9400.

Sincerely,



Patricia Sanderson Port
Regional Environmental Officer

cc:

OEPC, HQ,
FWS, Portland, OR
EPA, Guam
DAWR, Guam
DLNR, Hawaii
USDA WS, Guam

References

Impact of Posttyphoon Hunting on Mariana Fruit Bats (*Pteropus mariannus*), in Press, Pacific Science (2006) vol. 60, no. 4:531-539, J.A. Esselystyn, A. Amar, and D. Janeke.

Development of a prolonged estrus effect for use in Judas goats

Campbell, K.J., G.S. Baxter, P.J. Murray, B.E. Coblentz, C.J. Dolan. Manuscript under review. Project Isabela, Charles Darwin Foundation, Quito, Ecuador

Increasing the efficacy of Judas goats by sterilization and pregnancy termination.

Campbell, K.J., G.S. Baxter, P.J. Murray, B.E. Coblentz, C.J. Dolan, V.G. Carrion. Manuscript under review. Project Isabela, Charles Darwin Foundation, Quito, Ecuador

Contraceptive effect of a recombinant GnRH vaccine in Adult female pigs.

Miller, L.A., G.P. Talwar, G. Killian. 2006. 22nd Vertebrate pest Conference, March 2006. Berkeley, California.

Techniques and approaches for the removal of feral pigs from island and mainland ecosystems

Blake E. McCann, Kevin Ryan, and David K. Garcelon Proc. 21st Vertebr. Pest Conf. (R. M. Timm and W. P. Gorenzel, Eds.) Published at Univ. of Calif., Davis. 2004

BUREAU OF STATISTICS AND PLANS
(Bureau of Planning)
Government of Guam



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A7

JUN 27 2006

Mr. Scott Whittaker
Environmental Flight Chief
Department of the Air Force
Headquarters, 36th Wing (PACAF)
36 CES/CEV, Unit 14007
APO AP 96543-4007

Hafa Adai Mr. Whittaker:

The Bureau of Statistics and Plans has completed its review of the Draft Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, Council on Environmental Quality Regulations (40 Code of Federal Regulations [CFR] Sections 1500-1508) and 32 CFR 989 (Air Force Environmental Impact Analysis Process), 15 July 1999, and amended 28 March 2001.

The Air Force proposal is to establish a base unit within Andersen Air Force Base (AAFB) in Guam, which would be specific to Intelligence, Surveillance, and Reconnaissance (ISR)/Strike Task Force. The proposed action will be conducted in four phases over a ten year period beginning in FY 2007. The proposal consist of intelligence, surveillance, and reconnaissance, strike, and aerial refueling aircraft at Andersen.

Three alternatives have been proposed:

Alternative A would base 12 KC-135 tankers and four Unmanned Aerial Vehicles (UAV) and personnel and rotate 48 F-22 and F-15E fighters and six B-1, B-2, and B-52 bombers and personnel from various places statewide. When fully established, the increase in base personnel will include approximately 3,000 when combined with additional military, Air Force civilian, contractor and dependent personnel. In addition, facility construction, addition, and alteration projects would occur to support ISR/Strike establishment and operation activities which include approximately 190 family housing units and associated family housing. This alternative will also include conservation measures to mitigate the effects of construction and operation activities on biological resources.

Alternative B would utilize a rotation of aircrafts from the mainland areas and permanently base four UAV's and personnel. A total of 1,850 personnel would be based in Guam and 190 housing units and supporting structures would not be built here.

No Action Alternative the ISR/Strike Force capability would not be established. The daily operations, activities, and exercises that Anderson Air Force is currently engaged in will continue at its current level.

Although the least impacting alternative will always be the no action alternative, GCMP has taken the most likely impacted Alternative A into consideration as the most likely to create potential impacts.

The Bureau's concerns are as follows:

A7-01 | **Flight Operations and Increased Decibel levels** - Is the AICUZ zone being widened in light of the additional runways that are being considered? Please include the current flight path, indicate the old AICUZ zone if any. The additional number of flights along with the constant rise in decibels may become a factor to the surrounding community which includes residential dwelling units, commercial business establishments, churches, and schools. It would be helpful if the flight increases occur at appropriate times of the day in consideration to the nearby community. The average busy day airfield operations would increase from approximately 235 operations to 381 operations. The number of flights may potentially affect the Endangered Species population as well and needs to be addressed accordingly.

A7-02 |

A7-03 |

A7-04 |

A7-05 | **Land cover and impervious surfaces** - The amount of land acreage is significant with this proposal. The expected clearing of 122 hectares of land will lead to various impervious surface related pollution potential such as petroleum wastes and accidental spills. In light of the additional aircrafts being housed here, there will be also aircraft washing and other related maintenance activities. Northwest field sits above the sole source aquifer system and must incorporate all anti-spill containment and counter-containment measures. In addition, it would be necessary to work with the Guam Environmental Protection Agency for its Soil Erosion and Sedimentation Control Measures, and obtain any other required permits.

A7-06 | **Endangered Species Habitat** - The Northern portion of the island is the home of the Mariana Fruit Bat and Mariana Crow. The expected loss of this habitat may affect the livelihood to these endangered species creating a negative impact. This is a very critical issue in light of the loss of habitat to these endangered species that are dependent on this particular forest in order to survive. It would be critical to work with the Department of Agriculture's, Division of Aquatic and Wildlife Resources office regarding the Endangered Species Act.

A7-07 | **Stored Fuel** - The expected increase in stored fuel and other hazardous materials is a major impact and would require primary and secondary containment devices. What are the existing procedures for delivery, transport, and removal of these fuels. A list of all chemicals, fuels and hazardous materials the Military plans to bring in should be added to the Environmental Impact Assessment for our review.

A7-08 |

A7-09 | **Personnel** - The number of personnel is expected to increase from 5,900 to 8,900, this would equate to an approximate 53% increase of the existing personnel now working in Anderson Air Force Base. This increase in personnel will impact the number of vehicles during peak travel times in and out of base. Routes 1, 15, and 3 now experiences heavy traffic and should be a consideration in the Environmental Impact Assessment. The number of housing units will also be an impact if all proposed facilities and dwelling units are not completed prior to any expected personnel relocation is to take place. According to the draft EIA current housing demands will be exceeded within the base housing thus requiring the need for additional housing.

A7-10 |

A7-11 | **Landfill Relocation** - The DOD should work with the Government of Guam officials in order to properly handle the amount of landfill wastes expected to be generated by the base operations. The development of the new landfill is not expected to begin construction and eventually operate for a number of years. The Hazardous wastes generated during and after construction should be sent off-island for proper disposal so as to minimize any impacts.

A7-12 |

A7-13 | The use of NonPoint Source Pollution Best Management Measures will have to be taken into account for all phases of development and the timeline of construction should be taken into account during the rainy season. The Bureau notes that this GCMP review in no way precludes the need for the Department of the Air Force to secure required federal and local permits. The review for Federal Consistency Determination will occur

upon submission of the required application. As always we reserve the rights to on site inspection of the proposal.

Thank you for giving us the opportunity to comment on this DEIS. The Bureau will be looking forward for the receipt of the Final EIS and submission of your Federal Consistency determination document for this proposed project. Should you require additional information or clarification on any section within our review, please do not hesitate to contact Ms. Evangeline D. Lujan, GCMP Administrator at 671-472-4201/2/3.

Sincerely,

A handwritten signature in black ink, appearing to read 'Alberto A. Lamorena V.', is positioned above the printed name.

ALBERTO A LAMORENA V
Acting Director

cc: DoAg
GEPA
DPR/HPO
DLM



EARTHJUSTICE

BOZEMAN, MONTANA DENVER, COLORADO HONOLULU, HAWAII
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June 26, 2006

By U.S. Mail and Facsimile Transmission

Scott Whittaker
Environmental Flight Chief
36 CES/CEV, Unit 14007
APO, AP 96543-4007
Fax No.: (671) 366-5088

Re: Draft Environmental Impact Statement for Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike (ISR/Strike) Capability at Andersen Air Force Base, Guam (April 2006)

Dear Mr. Whittaker,

I submit these comments on behalf of Earthjustice in response to the U.S. Air Force's May 3, 2006 request for comments on the Draft Environmental Impact Statement for Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike (ISR/Strike) Capability at Andersen Air Force Base, Guam (April 2006) ("DEIS"). For the following reasons, the DEIS falls far short of the basic requirements of the National Environmental Policy Act ("NEPA"). The Air Force should substantially revise the DEIS and re-circulate it for public review.

Inadequate Disclosure of Impacts

The DEIS fails to satisfy NEPA's mandate to take a hard look at the environmental consequences of the Air Force's proposed course of action. Initially, it contains no analysis whatsoever of potential impacts associated with "training range and airspace utilization" by the scores of fighters and bombers the Air Force proposes to deploy to Andersen, despite the Air Force's concession that they "may ultimately be relevant to significant adverse environmental impacts." DEIS at 1-5.¹ The DEIS's assertion that information regarding the environmental impacts of aircrew training "is not essential to a reasoned choice among alternatives" is legally

¹ Indeed, the DEIS does not attempt to characterize the number or type of required training sorties or even the ranges or airspaces that would be affected. That the Air Force may not yet have determined the specifics of its training does not relieve it of its obligation under NEPA to analyze these "reasonably foreseeable" impacts. 40 C.F.R. § 1502.22. Since the Air Force will be the ultimate decision-maker regarding required training, it has no excuse for failing to nail down the relevant details and include the missing analysis in the DEIS. Id. § 1502.22(a). Even assuming for the sake of argument the Air Force were incapable of detailing its training needs at this point, it still must evaluate training impacts as best it can, based on the information available to it. Id. § 1502.22(b).

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untenable. DEIS at 1-5. Obviously, the Air Force would not establish an ISR/Strike capability at Andersen unless it could adequately train the fighter and bomber crews who would be deployed there. Since establishing an ISR/Strike capability "[a]utomatically trigger[s]" the need for aircrew training, aircrew training on Guam "will not proceed unless" the ISR/Strike capability is first established, and both actions "[a]re interdependent parts of a larger action and depend on the larger action for their justification," they are "[c]onnected actions" that must be discussed in the same impact statement." 40 C.F.R. § 1508.25(a)(1). The DEIS's failure to do so cannot be squared with NEPA's basic purposes: to "insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken" and "to help public officials make decisions that are based on understanding of environmental consequences." *Id.* § 1500.1(a), (b) (emphasis added).

01-03

The DEIS also fails to address the potential for the establishment of the ISR/Strike capability at Andersen to make Guam a more attractive target for terrorism, a matter of grave concern to Guam residents. See Mar-Vic Cagurangan, *Chamorro groups ask UN to stop 'militarization'*, Marianas Variety, June 23, 2006 (attached); Gaynor Dumat-ol Daleno, *Valiant Shield tests base: Andersen prepares for long-term role in region*, Guam Pacific Daily News, June 22, 2006 (attached). The Ninth Circuit recently affirmed that federal agencies must analyze "the range of environmental impacts likely to result in the event of a terrorist attack." *San Luis Obispo Mothers for Peace v. Nuclear Regulatory Comm'n*, No. 03-74628, slip op. at 6094 (9th Cir. June 2, 2006).

01-04

In addition, the DEIS does not analyze the "departure of personnel and aircraft from the installations that would be the source for the personnel and aircraft that would be part of the ISR/Strike capability." DEIS at 1-5. While the Air Force apparently recognizes such impacts are part and parcel of its proposal to move these assets to Guam, the DEIS states merely that analysis of the impacts would be carried out by the "losing installation(s)." *Id.* This is a classic case of segmentation, which NEPA flatly prohibits. See 40 C.F.R. § 1508.25(a)(1).

01-05

The DEIS's discussion of the "no action" alternative is similarly flawed, since it fails to assess continued operation of the units at their current installations. NEPA requires inclusion of a "no action" alternative to provide a benchmark against which decision-makers can compare the magnitude of environmental effects of the action alternatives, and, thus, it is vital to allow for an accurate cost-benefit analysis. Without discussion of the environmental effects – adverse and beneficial – of continuing operations at current installations, the DEIS fails to provide the requisite information to "help public officials make decisions that are based on understanding of environmental consequences," defeating NEPA's purpose to "foster excellent action." 40 C.F.R. § 1500.1(c); see also *id.* § 1502.14; cf. 32 C.F.R. § 989.8(d) ("If no action would result in other predictable actions, those actions should be discussed within the no action alternative section").

01-06

The DEIS's failure to analyze the environmental impacts associated with various actions the Department of Defense intends to carry out on Guam in the near future, DEIS at 1-3, violates

NEPA's mandate to discuss cumulative impacts, which are "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." 40 C.F.R. § 1508.7; see also id. § 1508.25(a)(2). The Air Force is not excused from including such analysis in its DEIS merely because all the details of these undertakings are not yet known. See id. § 1502.22. For example, the planned relocation of 8,000 Marines (and their families) from Japan to Guam will have potentially significant impacts across the full spectrum of environmental factors canvassed in the EIS. See 4/26/06 American Forces Information Service Press Release (enclosed); Daleno, supra (noting "[t]he Air Force buildup, combined with the Marines' relocation to Guam and other aspects of increased military presence, could mean an additional population of 20,000 to 30,000 on Guam," which is "an increase of up to 20 percent in Guam's population").² To ensure the Air Force's decision whether to bring up to 3,000 additional personnel to Andersen AFB in connection with the ISR/Strike capability proposal is fully informed, the DEIS must address the environmental effects of the Marines' and Navy's proposed undertakings based on the information that is currently available. See DEIS at 2-6 (Alternative A would add 3,000 personnel, including military, Air Force civilian, contractor, and dependent personnel).³

Even when the DEIS does mention cumulative impacts, its discussion is so cursory as to be utterly useless to inform either the Air Force's decision-making or the public's understanding. To provide the hard look NEPA requires, the DEIS must provide more than generalized conclusory statements that effects are not significant or will be effectively mitigated. Mere narratives of expert opinions, such as those presented in the DEIS, cannot fulfill NEPA's mandate because they preclude effective public scrutiny of the Air Force's analysis.

01-07 Thus, for example, the Air Force must disclose in the DEIS the underlying environmental data that support its conclusion that destroying over 122 hectares of essential recovery habitat (nearly 2.7 percent of refuge land) "would not be expected to jeopardize the recovery and continued existence of listed species." DEIS at 4-71.⁴ Among other things, since the Air Force

² When one considers Guam's current population is only about 162,000, the impacts on traffic, land use, housing, schools, etc. of adding another 20,000 to 30,000 residents become self-evident. See Daleno, supra (citing 2005 Census estimate). That these new residents will be conducting military training makes other, severe environmental impacts inevitable.

³ Even if, as the DEIS asserts, "[t]he Navy and Marine Corps will address their projects in NEPA documents that cumulatively look at all DoD projects planned for Guam, to include Air Force projects," the DEIS would still be fatally flawed. DEIS at 1-3. Promises of future analyses by other agencies cannot make up for the Air Force's failure to consider cumulative impacts now. NEPA requires consideration of such impacts before the Air Force makes its decision on the ISR/Strike capability project.

⁴ The proposed action would destroy habitat the U.S. Fish and Wildlife Service ("Service") has determined is essential to the recovery of three critically endangered species

claims not all of the habitat that would be destroyed is of equal value to endangered species, the DEIS must disclose the percentage of suitable and preferred endangered species habitat – not just the percentage of all refuge lands – that would be lost, due to both the ISR/Strike capability project viewed in isolation and cumulatively. Compare DEIS Table 4.5-1 with DEIS Table 4.5-4 (only portion of 74 hectares to be cleared deemed “suitable” or “preferred” for Mariana crow or Mariana fruit bat). Moreover, the DEIS must justify its conclusion that destroying this suitable and preferred habitat would not significantly affect the survival or recovery of Guam’s endangered species.⁵

01-08

Similarly, the Air Force must explain the basis for its conclusion that Andersen’s brown tree snake (“BTS”) inspection program would ensure “no potential adverse effects to offsite [threatened and endangered] species, due to both the ISR/Strike capability project viewed in isolation and cumulatively. DEIS at 4-73 (emphasis added); cf. 9/26/05 Letter from Hawai’i Congressional Delegation (discovery in Oklahoma of brown tree snake from Guam) (reprinted in DEIS at Appendix B to Biological Assessment). On its face, this claim is extremely suspect since Andersen’s BTS program, even if otherwise infallible, does not – contrary to the DEIS’s claims – call for inspecting 100% of aircraft and goods departing Guam. Compare DEIS at 4-68 (claiming 100% inspection) with 36 WG Instruction 32-7004 at § 2.2 (Mar. 15, 2006) (listing exemptions) (reprinted in DEIS at Appendix C to Biological Assessment).⁶ Even if the Air Force believes the likelihood of BTSs being transported off Guam and reaching Hawai’i or other

native to Guam: the Mariana crow, the Mariana fruit bat, and the Guam Micronesian kingfisher. See 67 Fed. Reg. 63,738, 63,747-49, 63,757-59, 63,761-63, 63,769-71 (Oct. 15, 2002). While the Service ultimately excluded the ISR/Strike capability project areas from the final critical habitat designation for these three species, it did so solely on the ground that Andersen AFB’s Integrated Natural Resource Management Plan provides benefits to these species. 69 Fed. Reg. 62,944, 62,953 (Oct. 28, 2004). The final designation made clear that the forest habitat that would be destroyed should the ISR/Strike capability project go forward is still considered essential to these three species’ survival and recovery. Id. at 62,974-75; see also 9/30/05 Letter from Patrick Leonard, Pacific Islands Fish and Wildlife Office, at 1-2 (reprinted in DEIS Appendix A).

01-09

⁵ Among other things, the DEIS must respond to expert biologists’ concerns about the proposal to build new housing within the forested area between the golf course and the cliffline on the eastern portion of Andersen. See 6/22/05 Letter from Guam Department of Agriculture Director Paul C. Bassler at 2 (project would “jeopardize this corridor of habitat for native animals”) (included in DEIS Appendix A); 6/30/05 Letter from Guam National Wildlife Refuge Project Leader Gerald L. Deutscher at 1 (included in DEIS Appendix A). NEPA mandates that the Air Force assess, consider, and respond to these comments. 40 C.F.R. § 1503.4.

⁶ Notably, “[u]rgent missions, such as MEDEVAC, will not be delayed in order to accomplish a BTS inspection,” regardless of the potential risk of transporting snakes off-island. Id. at § 2.2.3.

vulnerable locations is low, the DEIS still must the potentially "catastrophic consequences" of the Air Force's proposed course of conduct. 40 C.F.R. § 1502.22(b)(3).

01-10 | In discussing the "no action" alternative, the DEIS inaccurately assumes the Air Force would not undertake any conservation measures unless it also moves forward with habitat destroying activities in pursuit of the ISR/Strike capability at Andersen. This assumption ignores the Air Force's affirmative obligation under the Endangered Species Act ("ESA") to "utilize [its] authorities in furtherance of the purposes of [the ESA] by carrying out programs for the conservation of endangered [and threatened] species." 16 U.S.C. § 1536(a)(1). Since the various conservation measures described in the DEIS are clearly feasible, the Air Force is legally obliged to implement them, regardless of its ultimate decision on the ISR/Strike project.

Significantly, even without the ISR/Strike project, the Air Force already has plans in the works to carry out many of the conservation measures detailed in the DEIS as part of the proposed action. In connection with its Northwest Field initiatives, the Air Force plans to conduct vegetation surveys relevant to recovery of Mariana crow and Mariana fruit bat that are "identical to the ISR/Strike conservation measure[s]." DEIS at 2-57. Likewise, even without the ISR/Strike project, ungulate movement studies, development of environmental education and awareness information, and BTS interdiction and control would be carried out. Id. at 2-54, 2-58. By asserting that none of these beneficial conservation measures would be implemented without the ISR/Strike project, the DEIS improperly presents a distorted view of impacts to endangered species and other biological resources.

01-11 | The DEIS's conclusory discussion of cultural impacts fails to take the requisite "hard look." Thus, while the DEIS concedes "the potential for encountering cultural materials is ... generally high" and "[a]ny disturbance or loss of cultural material would be ... adverse," it breezily asserts "[t]he Air Force is preparing and coordinating a [Memorandum of Agreement ("MOA")] with the [Guam Historic Preservation Office] that would mitigate significant adverse effects." DEIS at 4-87 to 4-88. Since the MOA does not yet exist, the Air Force lacks any basis for concluding there would be no likelihood of significant impacts, whether the ISR/Strike project is viewed in isolation or cumulatively. Furthermore, given that the Air Force has not yet surveyed all project areas for cultural resources and, thus, has no idea what it would encounter there, the DEIS's assertions about the lack of impacts are pure speculation. See DEIS at 3-71 (archaeological surveys incomplete for CRMAs II and IV; "[e]thnographic surveys have not been completed for any of the three CRMAs in the project area"), 4-86 (6 of Phase 1 construction projects and all projects within CRMA IV located in areas not previously surveyed). Because it is feasible for the Air Force to conduct cultural resource inventories and evaluations within the planned impact areas, the Air Force must carry out these surveys and include analysis of their results in the DEIS, before making any decision whether to proceed with the ISR/Strike capability project. See id. at 4-87 (Air Force intends to conduct cultural resource surveys "prior to any ground disturbing activities"); see also 40 C.F.R. § 1502.22(a).

01-12 |

01-13 Finally, the DEIS's analysis of socioeconomic impacts is completely one-side,
01-14 emphasizing only benefits, while ignoring the adverse effects on Guam's island economy of the
01-15 proposed influx of federal construction dollars and workers. There is no discussion of the
inevitable increase in housing prices for Guam residents when thousands of personnel associated
with the ISR/Strike project arrive on-island, siphoning off the supply of available housing. See
DEIS at 4-89 (noting "current supply of lower-priced rental vacancies falls significantly short of
the potential demand"). Nor does the DEIS consider how the "increased demand for local and
regional services, materials, and supplies" would generally inflate prices and, in some cases,
cause disruptive shortages, both of which would harm Guam's businesses and residents. *Id.* at
4-90. The Air Force must revise the DEIS to give the full picture of the likely socioeconomic
impacts the ISR/Strike project would trigger.

Inadequate Discussion of Alternatives

01-16 The alternatives analysis is the heart of the NEPA process. 40 C.F.R. § 1502.14. To
satisfy NEPA, the Air Force was obliged to analyze fully in the DEIS the environmental impacts
of pursuing not only its preferred alternative, but also a reasonable range of alternatives. See 32
C.F.R. 989.8(a), (b); 40 C.F.R. § 1502.14. NEPA mandates this full disclosure to permit the
informed public comment that is vital to ensure the Air Force takes a hard look at the
environmental consequences of its actions. Only by putting on the table, for its own and the
public's view, a sufficiently detailed analysis of the environmental consequences of its proposed
action and of alternatives that might be pursued with less environmental harm can the Air Force
satisfy Congress's command to make a fully informed choice between the various options.

01-17 In discussing why the Air Force eliminated from detailed discussion all location
alternatives other than Andersen, the DEIS fails to justify its assumption that, to accomplish the
stated goal of "maintaining regionally tailored forces, forward stationed and deployed in the
Asian theater," all of the ISR/Strike aircraft and related activities must be stationed at the same
installation. DEIS at 1-1. Notably, locating all assets at the same facility is not one of the
standards for selection of a "viable location for the ISR/Strike capability for the Pacific Region"
set forth in the DEIS. *Id.* at 2-1; see also *id.* at 2-2; cf. 32 C.F.R. § 989.8(c) (project proponents
cannot "so narrowly define [selection standards for alternatives] that they unnecessarily limit
consideration to the proposal initially favored by proponents"). Even if, as the DEIS claims,
Saipan and Wake lack the airfield infrastructure to support the entire proposed action, those
installations could house some of the ISR/Strike aircraft or related activities, reducing the
amount of construction activities and operations required at Andersen and, consequently,
reducing the severity of associated impacts.⁷ To inform its decision-making process, and the

⁷ For example, bringing the F-22s and F-15Es to a location other than Guam would avoid
the need to clear 74 acres of essential recovery habitat for the aircraft staging area. See DEIS at
2-13. Such an alternative would also eliminate the need to house 900 personnel on Guam and
would reduce noise impacts associated with fighter operations. See *id.* at 2-11, 4-10, 4-11.

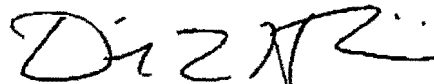
01-17
(...continued)

public; about alternatives that might accomplish its goals with few impacts, the Air Force must expand the DEIS's analysis to consider a reasonable range of alternatives involving stationing at more than one facility, or, in the alternative, must explain why stationing at more than one facility is not feasible. See 40 C.F.R. § 1502.14.⁸

The Air Force must also expand the range of alternatives considered for pursuing the ISR/Strike project at Andersen.⁹ As noted above, both state and federal expert agencies have raised serious concerns about the Air Force's proposal to build housing in the critical forest corridor that lies between the golf course and the cliffline on the eastern portion of Andersen. They have suggested a feasible approach to avoid impacts on endangered species from the construction: building the housing within the footprint of the existing golf course. See 6/22/05 Bassler Letter at 2; 6/30/05 Deutscher Letter at 1. The DEIS improperly fails to consider this reasonable alternative, which would "avoid or minimize adverse effects of [the Air Force's] actions upon the quality of the human environment." 40 C.F.R. § 1500.2(c).

We appreciate the opportunity to provide these comments which hopefully will prompt the Air Force to satisfy its obligations under NEPA by substantially revising its DEIS. Please feel free to contact me should you wish to discuss our concerns.

Sincerely,



David Lane Henkin
Staff Attorney

DLH/tt
Enclosures

⁸ Even if the Air Force believes Andersen has certain advantages over other locations does not relieve it of its obligation under NEPA to consider these basing alternatives. The Air Force may not disregard alternatives merely because they do not offer a complete solution to the problem or do not fulfill all goals completely. Moreover, it cannot lawfully refuse to evaluate all possible approaches to its ISR/Strike capability project that would alter the environmental impacts and the cost-benefit balance.

⁹ The two action alternatives discussed in the DEIS are virtually identical, with the only difference whether 12 KC-135s would be based at, versus rotated through, Andersen. See DEIS at 2-6, 2-36. The DEIS thus fails to "covering the full spectrum of alternatives," as Air Force NEPA regulations require. 32 C.F.R. § 989.8(b).

Marianas Variety

Micronesia's Leading Newspaper Since 1972

Friday, June 23, 2006

Chamorro groups ask UN to stop 'militarization'

*By Mar-Vic Cagurangan
Variety News Staff*

Amid the U.S. military's Valiant Shield exercises in the waters off Guam, local activists have launched an online signature campaign to petition the United Nations to "put on hold" the military buildup on Guam and in the Asia Pacific region.

"We believe that increased militarization will put our families, friends, and relatives who are living on Guam in harm's way rather than provide safety and stability," reads the Peace and Justice for Guam petition initiated by I Nasion Chamoru and the Guahan Indigenous Collective or GIC.

"As determined by the UN, increased militarization and lack of consent by the Chamorro people, infringes upon the right to self-determination," the petition read.

The activist groups, led by Debbie Quinata and Charissa Aguon, expressed concern that an increasing military presence on Guam would turn the island into a magnet for potential terrorist attacks.

They are displeased that the waters off Guam, which they describe as "anything but peaceful in the post-Sept. 11 era," are being used as the stomping ground for the five-day military exercises that involve 22,000 military personnel, 30 ships and 280 aircrafts from the carrier strike groups USS Kitty Hawk, USS Ronald Regan and USS Abraham Lincoln. (See story on page 12)

In an interview with reporters on board the USS Ronald Regan Tuesday, Rear Admiral Michael H. Miller, commander of Carrier Strike Group Seven, said exercises comprising the Valiant Shield include the firing of live ordnance and dropping of bombs.

B-2 aircrew members executed long-duration missions and integrated with aircraft they don't typically see on the range. The exercise also brought the Air Force's two most advanced weapon systems together, as F-22 Raptors from the 27th Fighter Squadron, Langley AFB, Va., joined B-2s during training missions on the Yukon Training Range near Eielson AFB, Alaska.

Capt. David Steindl, Destroyer Squadron commander, said the exercises also involve the enhancement of the Navy's submarine warfare and submarine detection capabilities.

The exercises, which will be concluded today, were launched Monday in the face of an expected North Korean missile launch, and U.S. demands that China be transparent about its own military activities.

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Article published Jun 22, 2006

Valiant Shield tests base Andersen prepares for long-term role in region

By Gaynor Dumat-ol Baleno
Pacific Daily News
gdumat-ol@guampdn.com

Andersen Air Force Base roared into action yesterday as the massive exercise Valiant Shield unfolded, testing the base's capability to become a bigger player in helping to keep the nation secure.

Dozens of bombers, fighter jets, tankers and other planes visiting from other U.S. military bases took turns executing air maneuvers using the base for takeoffs and landings yesterday.

And when the exercise ends tomorrow, Andersen is not expected to switch into sleep mode.

In a shift from its role as a stopover for transient deployments, Andersen is flexing to be the longer-term home for more military air power and personnel.

Col. Michael Boera, Andersen's commander, described the change as something "along the lines of more permanency."

"We're no longer the 'Sleepy Hollow' base of yesteryear," Boera said.

Besides the previously confirmed plan to make Andersen a hub for Global Hawk reconnaissance planes and an air tanker squadron, the base also will become home to about 150 members of an Air Force engineering squadron called the Red Horse.

The Red Horse squadron at Osan Air Base in South Korea will make Guam home, Boera said. Already, about 30 Red Horse squadron personnel are at Andersen, he added. The timetable for the entire squadron's move was not specified.

Red Horse squadrons such as the one that's moving to Guam are like responders to 911 calls for operations such as building airstrips, building emergency roads for military operations and helping after landslides, tsunamis and other disasters.

In wartime, Red Horse provides aircraft-launch and recovery capabilities wherever the Air Force needs them, according to the Air Force Web site, www.af.mil.

Military spending

Andersen's expected buildup could mean \$2 billion to \$4 billion in construction activities on Guam, according to Pacific Daily News files.

The Air Force buildup on Guam is expected to complement the expected arrival of about 18,000 members of the U.S. Marines and their families who are relocating from Okinawa.

The Okinawa move alone has been reported, according to a previous military wire service report, to result in much as \$15 billion in military spending on Guam over 15 years, at the rate of almost \$1 billion a year beginning in about two years.

<http://www.guampdn.com/apps/pbcs.dll/article?AID=/20060622/NEWS01/606220303/100...> 6/23/2006

The Air Force buildup, combined with the Marines' relocation to Guam and other aspects of increased military presence, could mean an additional population of 20,000 to 30,000 on Guam, Boera said.

That could mean an increase of up to 20 percent in Guam's population, which the Department of the Interior said was at 162,000 based on a 2005 Census estimate last year.

The anticipated military buildup on Guam is being discussed in the backdrop of reported potential military threats from China and North Korea.

Guam's location, which significantly cuts U.S. military planes' travel time to potential Asia-Pacific hotspots, has become the key selling point for those who support military buildup on Guam.

Taking advantage of Guam's "cherry location," said Lt. Gen. David Deptula, commander of the Gen. George C. Kenney Warfighting Headquarters in Hawaii, allows U.S. military forces to move in the Pacific "in a matter of hours, as opposed to days, or weeks." Deptula spoke from Hawaii yesterday via live video to a small group of national, regional and local media who gathered at a videoconference room at Andersen.

The ongoing military exercise, which also involves three aircraft carriers, 28 naval ships and about 20,000 service members simulating war scenarios in waters off Guam, is happening as the potential looms for North Korea to test-fire a missile with a reported range reaching the West Coast.

Military officials yesterday declined to talk about the North Korean situation.

In general, Deptula said, the U.S. military has a variety of forces that allows response to "any kind of aggression."

But while many Guam residents support increased U.S. military presence, a group of indigenous residents issued a statement calling for a suspension of American military buildup here.

Increased military presence will make Guam a target of potential adversaries of the United States, according to the I Nasion Chamoru and Guahan Indigenous Collective statement.



AMERICAN FORCES INFORMATION SERVICE **NEWS ARTICLES**

Eight Thousand U.S. Marines to Move From Okinawa to Guam

By Steven Donald Smith
American Forces Press Service

WASHINGTON, April 26, 2006 – The United States will move 8,000 Marines from Okinawa, Japan, to Guam by 2012, Defense Department officials said here yesterday.

The move is part of a broader Alliance Transformation Realignment agreement between the U.S. and Japan. An agreement in principle for the move was made in October with the Security Consultative Committee Report. It was finalized April 23, when U.S. Defense Secretary Donald H. Rumsfeld and Japanese Minister of State for Defense Fukushima Nukaga met at the Pentagon to work out cost-sharing particulars, DoD officials said.

"The Marine relocation to Guam should be seen in the context of the whole range of changes being made to transform the alliance," Richard Lawless, deputy undersecretary of defense for Asian and Pacific affairs, told reporters at the Pentagon. "The idea is to resolve, in one fell swoop, all or almost all of the long-standing issues that have inhibited the alliance going forward.

"It's a very important part, but it's just one part of something that is much, much larger in the relationship between ourselves and the government of Japan," he continued.

Implementation procedures for the relocation are still being drawn up and fine-tuning of the total realignment package is ongoing, he said.

Defense officials characterized the realignment of U.S. forces in the Pacific as a strategic move, similar to domestic Base Realignment and Closure moves.

"In many ways this is similar to the resource trades that we've made to secure broader transformation domestically with BRAC," Philip W. Grone, deputy undersecretary of defense for installations and environment, said. "These are choices we've made in the broader national interest."

Lawless said the alliance transformation will make the partnership between Japan and the United States more balanced, with Japan assuming more responsibilities in the relationship. "We're trying to transform this alliance to one that is much more balanced, interoperational, where roles and missions are more clearly shared among one another," Lawless said.

The realignment limits the burden of the Japanese people but still allows the U.S. to maintain credibility and deterrence in the region. "That's the balance we've struck with this particular arrangement," he said.

Some U.S. troops will remain on Okinawa but will be moved from the Futenma Air Station to a new location at Camp Schwab. "Futenma involves a relocation of forces on Okinawa," Lawless said. "It's part of a consolidation."

Lawless said U.S. forces and the Japan Self-Defense Force are cooperating in a number of other areas as well, including with air defenses and the collocation of troops at Yokota Air Base, Japan. "That is a very tangible benefit to the alliance. That we are collocating our forces makes us much more interoperable and creates a truly bilateral interoperative, balanced alliance," he said.

In addition, the USS George Washington will be based in Japan in coming years, which demonstrates the importance the U.S. places on the alliance, Lawless said. "This is the only place a carrier will be based outside of the United States of America," he said. "We told the Japanese people we'd only send the best capability, and that's what we're doing with the George Washington."

Biography:

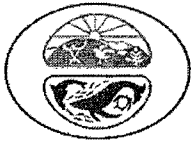
Philip W. Grons

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Conservation Council for

Hawai'i

02

June 27, 2006

Jonathan Wald
Chief, Environmental Planning
36 CES/CEV, Unit 14007
APO, AP 96543-4007

Via U.S. mail and email: jonathan.wald@andersen.af.mil

Re: Comments on Draft Environmental Impact Statement Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability Andersen Air Force Base, Guam, Department of the Air Force Pacific Air Forces Hickam Air Force Base,

Hawai'i April 2006

Dear Mr. Wald,

Aloha. The Conservation Council for Hawai'i submits the following comments on the Draft Environmental Impact Statement Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability Andersen Air Force Base, Guam, prepared by the Department of the Air Force Pacific Air Forces Hickam Air Force Base, Hawai'i, April 2006 (DEIS). Our comments relate to the transport of brown treesnake off-island. We also wish to incorporate our December 16, 2005 and May 4, 2006 comments on the two Draft Environmental Assessments for the proposed Beddown of Training and Support Initiatives at Andersen's Northwest Field, and request they be included in the DEIS record as well (attached).

1. The DEIS is inadequate in describing the impacts associated with the transport of brown treesnakes off-island.
- 02-01 | 2. The DEA is inadequate in describing the required mitigation measures involving brown treesnake control and interdiction. We found this to be the case in the two Draft Environmental Assessments of Beddown of Training at Andersen Air Force Base as well. In all three documents, the Air Force plays down the significant and likely event that the brown treesnake will continue to be transported to other areas, including Hawai'i, other Pacific Islands with high numbers of rare and endangered species, and the U.S. mainland.
- 02-02 | 3. The DEIS states that "The potential for off-Base transport of the Brown tree snake (BTS) would be low by using the Air Force BTS inspection protocol, which inspects 100 percent of all outbound aircraft and cargo."



Working Today for the Nature of Tomorrow!
Hawai'i Affiliate of the National Wildlife Federation

Telephone/Fax 808.593.0255 • email: info@conservehi.org • web: www.conservehi.org
P.O. Box 2923 • Honolulu, HI 96802 • Office: 250 Ward Ave., Suite 212 • Honolulu

Elsewhere, the DEIS notes that not all outbound aircraft and cargo will be inspected, which is contrary to the statement above.

02-03 4 | Where is the "Air Force BTS inspection protocol" written down? Is the
02-04 | protocol all-inclusive of brown treesnake control and interdiction on
02-05 | Guam? Are there other relevant protocols? Was the protocol developed and
02-06 | approved by expert wildlife agencies? How will the protocol be funded?
02-06 | How does the protocol interface with the instruction included in the back
02-06 | of the DEIS, other brown treesnake protocols referred to the DEIS, the
02-06 | brown treesnake control plan, and any other documents related to
02-06 | brown treesnake control and interdiction?

02-07 5 | The DEIS refers to documents related to brown treesnake interdiction, but these documents are not included as appendices to the DEIS.

6. The DEIS mentions other agencies and procedures related to brown treesnake interdiction (example, COMNAVMARIANAS for inspection of personally owned vehicles shipped from Guam), but it does not include sufficient detail on how these agencies will insure brown treesnakes are not transported off island. Descriptions of the aerial port cargo warehouse and other holding areas for outbound cargo are vague, as is the discussion on containerized household goods by carriers and/or local agents.

7. It is difficult, if not impossible, for the public, elected officials, and decision-makers to determine whether the proposed mitigation measures regarding brown treesnakes are adequate and whether the mitigation measures will be effective.

02-08 8 | We urge the Air Force to work with the U.S. Fish and Wildlife Service, U.S. Department of Agriculture, and other relevant agencies, and prepare a comprehensive document for brown treesnake interdiction, including the role of all agencies involved; laws, instructions, orders, procedures, and protocols relevant to brown treesnake control and interdiction; necessary funding, staff, and infrastructure; funding sources and timetables; and any other information that will clarify how the Department of Defense intends to keep the potential for off-base transport of brown treesnakes low. This information is required by the National Environmental Policy Act and is essential to informed decision-making.

02-09 9 | The DEIS does not describe the cumulative impact of the proposed action, taking into account past, ongoing, and future military actions on Guam, including actions by other branches of the military (e.g., stationing of Marines from other U.S. bases in the Pacific).

10. Funding for the following mitigation measures should be included in the Air Force's operations budget for Guam:

- a. 100% inspection of all military and civilian cargo, vehicles, munitions, personnel, families of personnel, civilian contractors,

- household goods, privately owned vehicles, and anything else departing Guam from Andersen or any other military or civilian site, including sufficient staff and support during peak periods of transport;
- b. funding, full cooperation and support for Wildlife Services, including long-term, adequate office and kennel space on Guam;
 - c. brown treesnake trapping, capture, and toxicant use by Wildlife Services near inspection and quarantine sites on Guam;
 - d. funding for brown treesnake inspection and rapid response programs in Hawai'i, other Pacific Islands, and the U.S. mainland;
 - e. funding of brown treesnake applied research by the Department of Agriculture, U.S. Fish and Wildlife Service, National Wildlife Research Center, and other qualified agencies and organizations.

In sum, the DEIS does not meet the requirements of the National Environmental Policy Act. It does not adequately analyze or mitigate the impacts of the proposed action (including cumulative impacts) with regard to the brown treesnake and other matters. The Air Force/Department of Defense should be required to cooperate fully with federal and local agencies involved in brown treesnake control and interdiction. The Air Force/Department of Defense should be required to provide permanent adequate funding for brown treesnake control and interdiction on Guam and in all areas receiving shipments from Guam, and these agencies must mitigate the damage already caused by brown treesnakes.

Thank you for considering our comments.

Sincerely,

Marjorie Ziegler

c: Hawai'i Congressional Delegation
Governor Linda Lingle
Wildlife agencies and organizations

Marianas Audubon Society
P O Box 4425
Hagatna, Guam 96932

June 25, 2006

Scott Whittaker
Environmental Flight Chief
36 CESCEV, unit 14007
APO, AP 96543-4007

Re: Draft Environmental Impact Statement for the Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability, Andersen Air Force Base Guam

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (EIS) for the Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike (ISR/Strike) Capability, Andersen Air Force Base (AAFB, Guam). The objective of the ISR/ Strike Capability is to expand basing in the western Pacific to increase the military's ability to access areas of concern in Asia. The expanded basing would allow for rapid response to an adversary's military or political posturing. Guam was selected for the proposed establishing and operating of the ISR/Strike capability.

Three alternative actions have been presented in the Draft EIS. Alternative A which would base 12 KC-135 aerial refueling aircraft, four Global Hawk RQ-4 unmanned aerial vehicles (UAV) and support personnel at Andersen Air Force Base. Forty-eight F-22 and F-15E fighter aircraft and six B-1, B-2, and B-52 bomber aircraft and personnel would be rotated from bases in the 50 states. There would be facility construction, addition, and alteration projects including 190 family housing units and family housing support facilities. The population of AAFB would increase by about 3,000 people. Alternative B would establish the ISR/Strike capability by rotating 48 - fighters, 12 tankers and 6 bombers from bases in the 50 states. Four UAV's and support personnel would be based at AAFB. The Base population would increase by 1,850 people. No housing or associated family support facilities would be constructed. Under the third proposed alternative of No Action the ISR/Strike would not be established.

The Marianas Audubon Society (MAS) prefers the No Action Alternative since it would have the least impact on the environmental resources considered in this EIS and would (as stated in the Draft EIS) have no adverse impacts on threatened and endangered species including habitat deemed necessary for recovery of the endangered Mariana crow

(*Corvus kubaryi*), Guam rail (*Gallirallus owstoni*), of the Guam Micronesian kingfisher (*Halcyon cinnamomina cinnamomina*), *Serianthes nelsonii* and the threatened Mariana fruit bat (*Pteropus mariannus mariannus*).

03-01 | The Draft EIS states that the Air Force is determining the potential environmental consequences associated with establishment and operation of the ISR/Strike capability. The Air Force acknowledges awareness of potential moves of non-Air Force Department of Defense Units to Guam, 2205 BRAC-realignment, Navy and Marine Corps projects that presently do not offer sufficient details to be considered as cumulative impacts to the ISR/Strike action. Once this information becomes available (perhaps in late 2006) the Air Force should be required to reevaluate the possible impacts of all projects on Guam, making adjustments to reflect this new information. The fact that this information is not currently available should not absolve the Air Force of responsibility for the future impacts. The final EIS should not be completed until the synergistic impacts of all military related actions can be considered with respect to alteration of habitat that would affect recovery and perpetuation of significant species on Guam.

03-02 | The area proposed for impact under Alternative A and Alternative B encompasses land proposed for critical habitat to assist in the recovery of the above-mentioned threatened and endangered species. Critical habitat designation was excluded because an Integrated Natural Resources Management Plan (INRAMP) was written to manage these lands. Since habitat loss may be the number one reason for the decline and extinction of species, the final EIS should address exactly how much land is necessary for the support of the threatened and endangered species on Guam.

03-03 | According to the Draft EIS, under Alternative A and other actions, a total of 122.7 hectares of limestone forests would be subject to removal or alteration. This represents 2.7 percent of the Refuge Overlay and the Ritidian Unit of the Guam National Wildlife Refuge. While this is only a small percentage of the entire land area set aside for wildlife preservation, the fact that it can be subject to modification represents the unfortunate circumstance that there is no long term enforceable protection for keeping that necessary parcel of land intact. Since this is undeveloped land, it may, in the future, continue to be considered for inclusion in other actions requiring development. Each project, though small on its own, could chip away at the habitat, eventually leaving only tiny pockets of unaltered vegetation too small for recovery for support of threatened and endangered species. The INRAMP was written as a suitable alternative to Critical habitat it should not be so easily designed out. The Draft EIS states that cumulative effects would not result in any demonstrable adverse consequences. Conservation mitigation measures that set aside protected land in other locations cannot compensate for fractionation of property.

In addition to habitat loss, increased levels of noise and frequency of sound episodes have been identified as having possible impacts on the Mariana fruit bat and the Mariana crow. Although it has been observed that these species have in the past habituated to indirect effects of human activities such as noise, because of the increased levels of activities it cannot be predicted what their reactions will be. The final EIS should include a detailed

03-04 | plan of action for monitoring the behavior of the bat and crow to determine their reaction to the changes in their habitat. The plan should identify sources of funding and staffing as well as possible mitigation measures in the event that the populations do decline as a result of the noise.

03-05 | Conservation measures identified as mitigation for habitat loss should be described in detail in the final EIS. The detail should include sources of funding as well as a proposed timeline for implementation of the projects. The plan should also include a means of accountability or monitoring. In other words a review of who is going to make sure that these mitigation measures are actually put into action, reviewed for effectiveness, modified if and when necessary and perpetuated.

To minimize disturbance into habitat that is not slated for clearing or construction use of existing roads and those presently abandoned and unused should be a priority over construction of new roads. Minimal land clearing should also occur during construction of ungulate exclosure fencing.

03-06 | Mitigation measures should include a plan for the recovery of the endangered plant *Serianthes nelsonii*. This tree is found on the Air Force property although, not within the proposed ISR/Strike impacted areas. Because it is an endangered species, assistance in its recovery as mitigation for degradation of natural vegetated lands is appropriate.

03-07 | The final EIS should also include a plan to coordinate with the Government of Guam Aquatic and Wildlife Resources Division to assist with and augment their existing captive breeding and recovery efforts for the Guam rail and Micronesian kingfisher. The plan should address plans for the eventual release of these species into appropriate habitat on AAFB.

03-08 | Because of the increased arrivals of aircraft and personnel (both transient and permanently assigned) to Guam the potential for introduction of invasive plants and animals is increased. The final EIS should include a plan for identification of organisms of concern as foreign invaders and for their containment and possible elimination. Efforts should be coordinated with existing programs via both local Government of Guam programs and those established in agencies of the federal government.

03-09 | Because recreational hunting will no longer be allowed it is recommended that an ungulate eradication program (rather than depredation hunting) be devised and implemented. Funding for personnel and materials should be identified. Introduced deer and pigs significantly contribute to degradation of natural forested areas. Elimination rather than control of these species would allow for natural revegetation and recovery of forested areas. The plan should include specific provisions for control of non-native plant species.

03-11 | Outplanting of foraging trees important to Marianas fruit bat and Marianas crow has not been attempted before. Since there is no guarantee it would actually work and it would take many years to become effective, this plan should be considered as an additional

mitigation measure that does not contribute to the conclusion that the habitat for these species will actually be enhanced rather than an immediate mitigation measure.

Thank you for providing the Marianas Audubon Society with the opportunity to comment on the Draft EIS for the Establishment and Operation of an Intelligence, Surveillance, Reconnaissance and Strike Capability, Andersen air Force Base Guam.

Sincerely,

Gretchen R. Grimm
President
Marianas Audubon society



WRITTEN COMMENT SHEET

DRAFT ENVIRONMENTAL IMPACT STATEMENT:
PROPOSED ISR/STRIKE TASK FORCE ON
ANDERSEN AIR FORCE BASE, GUAM

05

Thank you for attending this public hearing. Our purpose for hosting this meeting is to give you an opportunity to comment on the findings of the Draft Environmental Impact Statement (EIS). Please use this sheet to bring to our attention potential environmental issues that you feel should be considered by the Air Force. You may use the back of this sheet if necessary.

Please print your comments below:

Date: 6-1-06

The presentation tonight reflects some of
concerns to the local people & local people
continue to do this.
We need to proceed to complete this
project to strengthen our country's
capability to deter aggression, & to prevent
in conflict, should conflict be imposed
upon our country.
God bless America!

Your Name (please print): Adolpho Palencia
Affiliation: Member, 38th Guam Legislature
Street Address: Guam Legislature
City, State, Zip: Agaña, GU 96901
Phone and/or Fax Number (optional):
email (optional):

Please hand this form in tonight, or mail it to:



Mr. Jonathan Wald, Chief of Environmental Planning
36 CES/CEV
Unit 14007
APO AP 96543-4007

Your letter must be postmarked by June 27, 2006
to ensure consideration in the Final EIS.



VIRGINIA POLYTECHNIC INSTITUTE
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Department of Biology

College of Arts and Sciences
Blacksburg, Virginia 24061-0406
(540) 231-6407 Fax: (540) 231-9307

P1

June 4, 2006

Mr. Scott Whittaker
Environmental Flight Chief
36 CES/CEV, Unit 14007
APO, AP 96543-4007

Dear Mr. Whittaker:

I am writing to comment on the April 2006 Draft Environmental Impact Statement for Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability, Anderson Air Force Base, Guam. I commented previously on the May 18, 2005 Notice of Intent to Prepare a Draft Programmatic Environmental Impact Statement. As stated previously in my comments about this and other recent projects on Guam, my interest is in the biological impacts of the proposed action, and my relevant background knowledge and expertise stems from my continuing service as a member of the Guam Micronesian Kingfisher Recovery Committee established by the U. S. Fish and Wildlife Service in July 2001. This committee formulated and has begun implementing a plan to restore native birds, including the Guam Micronesian Kingfisher, to Guam, and the native forests on Anderson Air Force Base figure prominently in these plans. The role of Northwest Field, specifically the Munitions Storage Area, as a release site for restoration of native birds is described in some detail in AFB's December 2003 Integrated Natural Resources Management Plan (section 6.4.1.1, and section 8.2.3), which indicates AFB's commitment to these environmental objectives.

P1-01 | It does not appear that the proposed project will have any direct, adverse effects on plans for
P1-02 | bird restoration, as what little forest loss will result from the project (chiefly the ASA) is located
P1-03 | far from areas to be used for releasing birds. There may be indirect effects on bird restoration
efforts due to having more people and more activity on Guam. It appears that the Air Force has
planned its activities in a way that minimizes impacts on bird restoration efforts. The EIS contains
some features that mitigate for forest loss, such as ungulate control, hiring a wildlife management
specialist, and establishing another site like Area 50. These will provide only limited benefits to
bird restoration as they are very small in scale. The major conservation action needed for bird
P1-04 | restoration is construction of a brown tree snake barrier around the MSA. USFWS recommended
including construction of this barrier as a feature of this project, but the Air Force elected not to do
so. Whether as mitigation as part of this or some other military project, or as an independent
effort, the Air Force needs to proceed with construction of the MSA barrier as soon as possible, so
that conservation efforts, currently stalled, can move forward. None of the other mitigation efforts
will produce any real benefits until this is done.

I appreciate having the chance to comment on this proposal. Please feel free to contact me should you wish to discuss my comments (540-231-3847; jrwalt@vt.edu).

Sincerely,

Jeffrey R. Walters
Jeffrey R. Walters
Bailey Professor of Biology



P2

UNIVERSITY OF GUAM
UNIBETSEDAT GUAHAN

College of Natural and Applied Sciences

June 25, 2006

Mr. Scott Whittaker
Environmental Flight Chief
36 CES/CEV, Unit 14007

Re: Comments on the ISR/Strike Draft EIS

Thank you for the opportunity to comment on Draft EIS for the proposed basing of the Intelligence, Surveillance, and Reconnaissance (ISR)/Strike Task Force on Andersen Air Force Base (AAFB). My comments on this draft EIS are based on six years of field work in limestone forest habitats in the southern Mariana Islands, and a three year study of the nocturnal movements of *Pteropus mariannus mariannus*, the Mariana flying fox (*fanihi*) funded by the United States Fish and Wildlife Service (USFWS) and the Guam Department of Agriculture, Division of Aquatic and Wildlife Resources (DAWR). The goals of my comments are to clarify some aspects of flying fox activity on AAFB based on my recent research, and to comment on proposed mitigation measures in an attempt to more effectively meet the needs of both AAFB, and the recovery and management of the threatened Mariana flying fox.

P2-01

The Draft EIS states that the current population of Mariana flying foxes at the Pati Point colony is under 30 animals. The population of flying foxes at the Pati Point colony is known vary seasonally, as well as throughout the day. The Draft EIS should report a yearly average from at least the last year, or perhaps last two years. In addition, not all bats present on AAFB are located at the Pati Point colony, the Draft EIS should acknowledge the existence of a non-colonial population of flying foxes, and that the current population in the northern forests is estimated at approximately 100 animals.

P2-02

The causes for flying fox declines reported in the Draft EIS are restricted to predation by BTS and incidental poaching, yet there are several references in the Draft EIS to forest degradation caused by feral ungulates. My own research indicates that feral ungulate impacts are reducing the density and diversity of flying fox forage tree species. Perez (1973) and Wheeler (1979) also attribute habitat destruction for military and civilian development as an important cause of flying fox declines island-wide. This

aspect should also be included in the Draft EIS, particularly in light of the fact that the proposed action calls for the destruction of currently occupied flying fox habitat.

P2-03 I would like to further clarify comments concerning the presence of flying foxes in the ASA project area. Draft EIS figure 3.5-4 indicates the telemetry location of a female flying fox from my study within the ASA project boundary, but outside the area designated for clearing. This position is misleading, giving the impression that the clearing of the ASA project area may not affect this flying fox. As proposed, the ASA project clearing will eliminate the entire core use area of this individual, and as much as 80% of its remaining foraging area. In addition, this was the exclusive foraging area for this individual (Bat F1 in my research), supporting her for seven months, through both wet and dry seasons and demonstrates the ability of this forest type to support flying foxes. According to the vegetation analysis conducted by Parsons and cited in the Draft EIS, Bat F1 made exclusive use of Guamia and Aglaia-Guamia forest type. The Draft EIS states that of 57.5 acres of potential habitat in the ASA project, only 3.5 acres (the Neisosperma-Macaranga forest type) is considered higher quality, yet Bat F1 rarely used the "higher quality" forest. There is no basis for considering Neisosperma-Macaranga forest "higher quality" forest. It is evident that Guamia and Aglaia-Guamia forest types are capable of supporting flying foxes and should be considered equally important to other forest types. The Draft EIS should be altered to reflect the quantity of Guamia and Aglaia-Guamia forest to be cleared as having a direct impact on flying foxes.

P2-04 The Biological Resources summary (Table ES-1) states that "no adverse modifications to species habitat associated with this proposed action would occur." This is based on the stated assumptions that the current habitat is already degraded and only a small area is to be cleared in relation to available habitat. This statement is incorrect as the proposed ASA project will virtually eliminate the entire foraging area of at least one flying fox, and potentially additional animals given the amount of similar Guamia and Aglaia-Guamia forest marked for destruction in the area. It is also incorrect to state that no adverse modifications will occur because only a small amount of degraded habitat will be eliminated. It takes a greater area of degraded habitat, with its reduced diversity and density of flying fox forage tree species, to support a population of flying foxes. This places a greater value (not the lesser value assumed in the biological summary) on each acre of degraded habitat, and increases the impact of eliminating even a small area of degraded forest. The Draft EIS should be amended to acknowledge the adverse impacts associated with clearing even small amounts of degraded forest.

It is clear that the ISR/Strike proposal will have an adverse impact on the threatened Mariana flying fox. However, AAFB does have an important national security mission, and the ISR/Strike proposal is part of that mission. There are limited options for locating the ASR project that fit with current AAFB plans and land availability. I believe that effective mitigation of the ASR project area and other potential impacts (e.g. increased noise) may benefit the Mariana flying fox in the long run, while still allowing AAFB to meet the requirements of its mission. The Mariana flying fox has already demonstrated an ability to adapt to some types of activity on AAFB, increasing the potential for flying foxes to coexist with base activities.

P2-05

The Draft EIS proposal lists a series of measures that AAFB believes will offset the anticipated disturbance to native wildlife. The proposed position of Wildlife Management Specialist is definitely a positive action. My concern, however, is that with the responsibilities currently planned for this position with associated planning and report writing, and additional responsibilities which will no doubt fall to this position in the future, that the Wildlife Management Specialist will become primarily an "in the office position", and that the Wildlife Management Specialist will either not develop an understanding of the unique needs of the limestone forest habitat (if the Specialist is not already familiar with this habitat), or will not be able to adequately monitor the field aspects that affect his responsibilities. I would like to see a second full time position added with, or under the supervision of, the Wildlife Management Specialist with an "in the field" focus of responsibility. Working together, these two positions will be better able to plan, execute, monitor and adapt wildlife mitigation and management projects.

P2-06

To mitigate forest loss in the ASR project area, AAFB proposes to fence and exclude ungulates from 494 acres of limestone forest in the Ritidian area. I commend AAFB for offering this sorely needed management of limestone forest. Ungulate exclusion, for a variety of reasons, is one of the most necessary actions toward recovering viable populations of flying foxes, and other native species, on Guam. However, while the proposed location of the exclosures may aid in reducing ungulate movements into the Guam National Wildlife Refuge from AAFB, its size and location give it a limited ability to positively impact flying foxes in the short term (< 30 years). Ungulate management, of the style proposed in the Draft EIS, should be implemented base-wide in all forested areas of the Overlay Refuge. Significant reductions in ungulate populations base-wide will allow all forests to improve in condition. A healthier forest will allow more flying foxes to survive on physically less land, reducing the impacts of clearing for the ASA. Base-wide ungulate management will address the current impacts of the ISR/Strike proposal, and get a head start in addressing future impacts of other changes in the AAFB land use needs. Forest recovery requires long periods of time (decades), and management in advance is far more beneficial to the wildlife than attempts to manage the impacts when they occur. If base-wide ungulate management is being considered by AAFB in the upcoming INRMP review, the Draft EIS should acknowledge that fact.

P2-07

The location of the proposed exclosures requires additional thought. From reading the Draft EIS, this location appears to have been selected for its Priority 1 Mariana crow habitat designation, and the ease of fencing using cliffs as a barrier. It does not appear that the needs of flying foxes were addressed in selecting this location. Since it will be flying foxes that will be most directly impacted by the ISR/Strike proposal, serious thought should be applied as to how best to set forest exclosures to benefit flying foxes. With flying fox benefits in mind, I suggest looking at areas in the Pati Point Conservation Area, Tarague Basin, and between the ASA project area and the Tarague cliff line. Many of these areas are not under current ungulate management whatsoever, and include historic roost sites should the Pati Point colony move, be disturbed by flight activities, or recover to the point where the colony splits. In addition, flying foxes at the Pati Point colony currently use these areas as night flight routes to current foraging areas,

or as foraging areas themselves. Recovering forest in the Pati Point and Tarague Basin areas is more likely to attract the attention of transiting flying foxes, improve the foraging of flying foxes currently using the areas, and is more likely to draw flying foxes away from areas of proposed impact in this, and other AAFB development projects, a stated goal in the Draft EIS. This area is also more insulated from the potential threat of incidental or intentional poaching (though no area is impervious to the threat), and is also a Priority 1 Mariana Crow habitat area. All three of the flying foxes tracked during my research made use of these areas I have suggested for relocating the proposed ungulate exclosures. The currently proposed exclosure areas are more exposed to the potential poachers being closer to AAFB borders and areas of civilian population in Uruno and Jinapsan. I have also noted that flying fox activity in the Draft EIS proposed areas is relatively low, having observed these areas using nightvision on numerous occasions during the course of my research.

P2-08

In addition to ungulate exclosures, the Draft EIS proposes to outplant flying fox forage tree species in 50 X 50 m plots. The current location proposed for these tree plots is in open, herbaceous cover areas. It is my opinion that given the small size of these plots in open, unforested areas makes them especially prone to typhoon damage during every stage of their life, limiting their potential usefulness. These open herbaceous areas would be better managed as a whole using a diverse mix of native forest species to reestablish a typhoon resistant forest. The idea of supplementing forest areas with flying fox food trees has merit, but should be conducted on large scale in ungulate excluded areas in order to provide a high density and diversity flying fox food species. As currently proposed, these foraging plots appear to be more of a focal point to draw the attention of wildlife regulators to specific acts of attractive mitigation rather than meaningful attempts to increase the forage value of the forest.

P2-09

It must also be considered that due to decades of poor forest management, it will take decades, if not longer, for the forest to recover. Forest management projects proposed as mitigation for the ISR/Strike proposal will take far longer to achieve a successful offset of impact than the 10-years of phased development by AAFB. AAFB is asking to be allowed to immediately and acutely impact the habitat, and suggesting long term mitigation. I am concerned for continuation of these mitigation projects through the 10-years of phased ISR/Strike development, and on into the future. The proposed mitigation projects are only viable if continued for many decades into the future, and the continuity of environmental projects on AAFB has suffered from a lack of commitment as environmental positions experience personnel turnover (*Serianthes nelsonii* outplantings and exclosures are an example). Mitigation projects cannot be allowed to stall or be disrupted by a future lack of commitment by the Department of Defense or lack of financial support. Safeguards must be place on any mitigation AAFB commits to, to guarantee AAFB support and funding for at least as long as the land is occupied by the US Government.

P2-10

I am also concerned about the increase level of noise associated with the increase in aircraft activities at AAFB as part of the ISR/Strike proposal. I have stated in the past that acclimation to aircraft noise is likely, however, I personally am not familiar with the

P2-10
(...continued)

P2-11

P2-12

noise levels associated with the F-22, an aircraft expected to be based at AAFB, or the cumulative effects of noise caused by the 45% increase in flight activities on base. I am also concerned about the 13% of flight operations expected to occur at night. It is not clear how much of an increase this represents over current operations. This activity is particularly important as it occurs during the active time for the flying foxes. I am happy to note that AAFB will conduct studies of noise effects on the flying foxes throughout the phased development of this study. I would like to add that this study should not only observe acute reactions by the flying foxes to aircraft noise, but also cumulative effects of noise increases that may cause movements away from the Pati Point colony or emigration to Rota. The noise study should also be flexible enough to adapt to changes in flying fox roosting location, should such an event occur. To adequately monitor flying fox behavior, I suggest that AAFB fund a telemetry study to be conducted from project initiation until 18 months after completion for the final phase of development. This study would be extremely valuable for several reasons, initially, a telemetry study would allow wildlife managers to continue to develop baseline data on current flying fox movements and foraging behavior initiated by my own research. Data from this study would help direct vegetation surveys of flying fox habitat suggested in the Draft EIS. It would also help determine normal flying fox movements and aid in identifying aberrant nocturnal behavior that may be caused by changes in air operations. This would give AAFB the ability to effectively direct the adaptive management of air operations suggested in the Draft EIS. A telemetry study would also allow an evaluation of forest recovery efforts (ungulate exclosure areas) designed to benefit flying foxes and other wildlife proposed in this Draft EIS. This information may provide validation for the measures taken, or help guide the adaptation of future management. Further, it is acknowledged that the BTS is a serious threat to the flying fox on Guam, continued telemetry studies would give us greater insight into the behavior of the flying fox which may help BTS researchers develop an interdiction plan to reduce flying fox pup mortality. Telemetry studies on Guam are certainly difficult given the need to capture study animals out of a very small population. However, my successful capture of three flying foxes in one month (three captures in 7 attempts) under similar low population conditions, supports my opinion that catching flying foxes on Guam for research is feasible, and limited only to the degree of effort put into capturing them.

P2-13

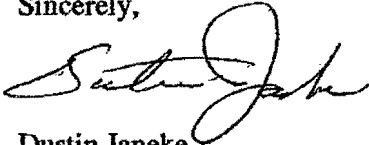
Lastly, BTS control at the Pati Point colony has been proposed as a mitigation objective. The purpose of this action is to attempt to reduce BTS predation on young, nonvolant flying foxes. The need for control at the Pati Point colony is based on the assumption that the mortality of young occurs when young bats are left at this location when mothers go out to feed. As originally stated by Wiles (1987a), predation on nonvolant bats may occur either at the day roost *or* out in foraging areas. Recent observations at the Pati Point roost using nightvision, indicated that young flying foxes present in the colony during the day were not present at night after the adults departed the roost. Additional observations of three juvenile flying fox skeletons in the forest in Tarague Basin also casts doubt that the suspected predation of nonvolant young takes place at the Pati Point colony. Attempting to control BTS at the Pati Point colony will be expensive, and at this point, unnecessarily risks disturbing the colony. Disturbance may lead to the resettlement of the colony in an area less compatible with AAFB operations,

P2-13
(... continued)

more exposed to potential hunters or feral predators, or a departure of the colony from Guam completely. Disturbance leading to a relocation of the colony would also reset BTS control attempts back to square one. I recommend that plans to control BTS at the Pati Point colony be postponed pending further observation of the Pati Point colony. If it can be determined that young bats are in fact being left at the Pati Point colony, providing the opportunity for BTS predation, then I would support BTS control measures in this area.

In summary, I feel that activities in the ISR/Strike proposal, and in particular the ASA project area will negatively impact flying foxes on Guam. However, I also recognize the importance of the AAFB mission to support our national security. The goals of AAFB and Mariana flying fox management and recovery can both be met through effective mitigation of the ISR/Strike proposal. I suggest changes to include a second position associated with the Wildlife Management Specialist, expansion of ungulate management to included all forested areas of the Overlay refuge, initiation of ungulate management in the Pati Point Conservation Area and Tarague Basin (as opposed to the Ritidian area), the initiation of a long term telemetry study to monitor the activity of flying foxes over the duration of the ISR/Strike development, and postponing attempts to control BTS at the Pati Point colony pending further observation.

Sincerely,



Dustin Janeke
University of Guam
College of Natural and Applied Sciences
DAWR Research Cooperator

26 June 2006

Mr. Scott Whittaker
Environmental Flight Chief
36 CES/CEV, Unit 14007
APO AP 96543-4007

Re: Draft Environmental Impact Statement on the Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike (IRS/Strike) Capability at Andersen Air Force Base, Guam.

Dear Mr. Whittaker:

Thank you for the opportunity to comment on the Draft EIS for the Establishment and Operation of the IRS/Strike Capability at Andersen Air Force Base on Guam. In general, I found the draft document to be very well prepared, answering many of the concerns raised during the public scoping meeting and comment period associated with the project's NOI. However, I have both comments and suggestions on the current document and will address first the general framework of the Draft EIS and then several specific outstanding issues.

General:

1. It was dismaying to note that neither the target range/training space that will be integral to the projects already proposed or underway on Andersen, nor the publicized relocation of 8,000 military personnel from Okinawa to Guam were included in the cumulative impacts analysis of reasonably foreseeable future actions. While it is possible that the Navy has not supplied the Air Force with complete information on its expansion plans, according to the local newspapers it seems that the populace of Guam has enough information to start considering adjustments to its health care facilities, transportation system, and other public infrastructural changes. The lack of an estimate of the impact an additional 8,000 or more people will have on sectors such as housing, the economy, transportation, and biological resources, leaves the Draft EIS fatally flawed. The exclusion of such large upcoming projects from this document draws into question the veracity of the analyses and makes it nearly impossible to assess the impacts of the proposed actions in the context of the other major changes occurring on Guam.
2. Three alternative actions are considered in the EIS. Alternative A outlines the permanent basing of 12 tankers and 4 UAV's at Andersen with the rest of the IRS/Strike force rotating in from other facilities. Under Alternative A on-Base military, civilian and contractor personnel would increase by 1,900 plus 1,100 military dependents; off-Base personnel would increase by 1,800 migrant laborers contracted to build additional housing and schools (totaling 4,800 additional

P3-01

people). Alternative B is similar in concept but would rotate the tankers as well as the rest of the Strike force. Alternative B would require that 100 additional military personnel plus 100 dependents be stationed on-Base, 1,650 people would rotate from other facilities, and 1,600 off-Base migrant workers would be employed for the project (totaling 3,450 additional people with no additional housing). Conservation measures would be the same under both scenarios. The third alternative is No Action, but only alternatives A & B are under practical consideration. Alternative A is the preferred action. With respect to the above, I'd like to discuss two points:

P3-02

a. Although Alternative B appears to have a lower impact on infrastructure and utilities than Alternative A (e.g., less water use, lower energy and waste water treatment demands, etc.), it has not been chosen as the preferred alternative. The lower environmental impact of Alternative B and the statistics as presented in the Draft EIS seem to contradict the statement on ES-11 that Alternative A is more "environmentally conservative". I suggest that in the Final EIS the reasoning behind the selection of Alternative A as the preferred choice be detailed; and

P3-03

b. Both alternatives A & B specify that construction will rely on an off-island, migrant labor pool requiring that nearly 900 additional housing units be built off-Base. The impact of this on off-Base resources and the island's cultural fabric may be far reaching. I suggest that the Final EIS incorporate some plan to utilize at least a portion of the nearly 4,700 unemployed (pp. 3-77) on Guam thus alleviating some of the pressure on local land resources and social infrastructure.

3. The Draft EIS consistently states that proposed actions would not adversely affect populations of threatened and endangered species or their recovery, and that there would be no adverse modifications to species habitat. I find these statements to be misleading for the following reasons:

- a. approximately 74 ha of forest useful to the endangered Mariana crow, endangered Micronesian kingfisher, and threatened Mariana fruit bat, will be removed by the proposed action. Rather than being "small in comparison to available habitat" (ES-7), the lost acreage is equal to 46% of the area set aside as critical habitat for these species;
- b. the proposed removal of forest in the Air Strike Area will affect habitat that has, or might potentially support, Mariana fruit bat foraging (pp.3-51), Mariana crow (pp. 3-52) and Micronesian kingfisher (pp. 3-53) nesting and foraging, as well as Guam rails (pp. 3-55);
- c. the Draft EIS states that "noise from aircraft overflights *would* affect the Mariana fruit bat and Mariana crow recovery efforts as well as current populations" (ES-7, emphasis added);
- d. the 22 March 2006 letter from Lt Col. Marvin W. Smith, Jr. to Mr Patrick Leonard attached to the Biological Assessment states that "we have determined that the proposed action may affect, but is not likely to adversely affect any listed species found on Andersen AFB *with the exception of the Mariana fruit bat*" (emphasis added); and,

- e. the effects determination (of no adverse impacts) is based in part on the assumption that existing habitat on Andersen will continue to degrade. However, Andersen has an extensive INRMP (Integrated Natural Resources Management Plan) that already details projects such as ungulate control, that if put into effect, would make the assumption spurious.

P3-04

I suggest that the Final EIS more clearly state that the proposed actions would negatively impact biological resources. Whether and how these impacts will be ameliorated by the proposed conservation measures are separate issues.

4. The Draft EIS claims (ES-7) that the potential for off-Base transport of the Brown Treesnake (BTS) is low because the Air Force BTS protocol requires 100% inspection of all outbound aircraft and cargo. It is not clear from the correspondence in Appendix B whether or not this is currently the case. I draw your attention to the 7 November 2005 letter from Under Secretary of Defense Kenneth Krieg to Senator Daniel Inouye which states, "We plan to *increase and enhance* our efforts to ensure 100% of all military cargo and carriers departing Guam are snake-free" (emphasis added). If the March 2006 BTS protocol is now in effect, then it is probable that USDA-Wildlife Services, the agency responsible for the inspection of outbound aircraft and cargo, has been challenged to meet the increase in inspection duties. Proposed Alternative A would add at least 220 more shipments to be inspected (pp. 4-68) in compliance with the new protocol, which seems a large burden to place on an already strapped agency. Because BTS interdiction is critical to the environmental security of many areas of the U.S., I urge the Department of Defense to include as part of the proposed action a conservation measure that funds a Wildlife Services expansion (e.g., hiring of personnel, training, and purchase of detector dogs) to meet the perceived needs.

P3-05

5. Although I think that most of the conservation measures associated with the proposed actions are laudable, I question the number of key responsibilities assigned to the one additional Natural Resources Management position envisioned; the Wildlife Management Specialist. It seems to me that conducting ungulate control; trapping rodents, cats and feral dogs; and trapping BTS at Pati Point would be an overwhelming number of tasks for one person, let alone taking on further responsibilities. I suggest that 2 - 3 new staff positions be created (and filled) in order to fulfill the duties associated with the proposed conservation measures.

P3-06

6. Several of the proposed conservation measures seem like excellent projects that may aid the recovery of the species. However, it also seems that several of them, such as the vegetation assessments (pp. 2-33) of habitats and areas of value to the Mariana fruit bat, Mariana crow, and Micronesian kingfisher, not only duplicate measures proposed in the Northwest Field Beddown and Training Initiative (pp. 2-57) but are also projects already proposed in Andersen's INRMP. It does not seem appropriate that these measures should be proposed again in this document. Here, it would highly fitting to propose the construction of a snake-proof barrier

around the perimeter of Andersen as a strong measure to control BTS on the Base. Snake control inside of the barrier would benefit all T & E species including those such as the Micronesian kingfisher and Guam rail that are being held in captivity pending release onto the Base. A snake-proof perimeter barrier would provide the Air Force with an excellent opportunity to cut the costs of BTS interdiction on military personnel, improve Base security, and concurrently take a real step toward the recovery of endangered and threatened wildlife on Guam.

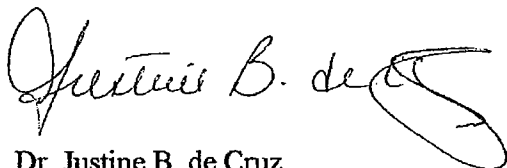
Specific issues:

- P3-08 | 1. Table 4.5-2 should also list the captive breeding program on Guam for the Guam rail, Micronesian kingfisher, and Mariana crow.
- P3-09 | 2. Table 4.5-4 lists 25.7 ha of Mariana crow habitat as subject to clearance, which is not consistent with the text on pp. 4-65 (57.5 ha of potential habitat to be cleared).
- P3-10 | 3. Both of the above tables are misleading because the cumulative impacts of the projects on Andersen affect at least twice as much habitat as is given.
4. The Draft EIS consistently refers to the protection and management of 200 ha of habitat suitable for Mariana crows and Mariana fruit bats as if they were newly set aside for the conservation of the species. This is misleading because the areas proposed for ungulate management are already included in the Overlay Refuge and some of the proposed projects duplicate those already planned under Andersen's INRMP. The conservation measures do not add new acreage to any protected area and so do not directly offset the loss of forested habitat to the proposed action. Because the USFWS considers all of the Overlay Refuge as critical to the recovery of the species, it is misleading for the Draft EIS to state or imply (as on pp. 4-65) that loss of any of the habitat remaining to these endangered species will not affect the populations or the recovery of the species.
- P3-11 | 5. Many of the studies cited on pp. 4-66 may not be applicable to island species that do not respond in ways similar to mainland species. There is a large body of scientific work that has demonstrated the particular vulnerability of insular species to introduced predators, for example. An innate predator response mechanism is often absent in island species because they have evolved in the absence of predators. I think that much of what is written in lines 5 – 23 on pp. 4-66 is probably not appropriate to the situation on Guam and should be omitted.
- P3-12 | 6. The claim that conservation measures described in Chapter 2 would "reverse the continued degradation... of important habitat" and that "species would utilize the better-quality habitat" (pp. 4-69 and 4-70) imply a degree of certainty that is not shared by all workers. These statements are probably too strongly worded.
- P3-13 | 7. The idea that the areas proposed for protection from ungulate pressure would provide a curved "corridor" for Mariana crows and Mariana fruit bats traveling between nesting and foraging areas (pp. 4-74) seems as likely as the idea that both highly volant species would fly straight across an open space to get to where they wanted to go.
- P3-14 | 8. With respect to bird/wildlife-aircraft strike hazard, instead of discussing how aircraft would remain 1,000 feet above ground level to avoid bird strikes (pp. 4-

107), I would like to see the Draft EIS discuss the likelihood of interactions at low altitudes, for instance, on take-off and landing, when planes are most likely to run into birds.

Again, thank you for this opportunity to comment on the Draft EIS. I am confident that the Air Force and the Department of Defense will find a workable solution so that the needs of national security and the needs of the environment can both be met.

Sincerely,

A handwritten signature in cursive script, reading "Justine B. de Cruz". The signature is written in dark ink and includes a large, stylized flourish at the end.

Dr. Justine B. de Cruz
Biologist

P6



WRITTEN COMMENT SHEET

DRAFT ENVIRONMENTAL IMPACT STATEMENT: PROPOSED ISR/STRIKE TASK FORCE ON ANDERSEN AIR FORCE BASE, GUAM

Thank you for attending this public hearing. Our purpose for hosting this meeting is to give you an opportunity to comment on the findings of the Draft Environmental Impact Statement (EIS). Please use this sheet to bring to our attention potential environmental issues that you feel should be considered by the Air Force. You may use the back of this sheet if necessary.

Please print your comments below:

Date: June 1, 2006

Since cultural resources is an integral part of a complete Environmental Impact Study, my suggestion is to make sure that any construction project is monitored by a cultural resource manager. Areas of concern include but not limited to: (a) WW II history (last mission, anti-factories) (b) ancient Chamorro history/sites/artifacts (c) Spanish period artifacts

Your Name (please print): Cole Herndon

Affiliation: _____

Street Address: _____

City, State, Zip: _____

Phone and/or Fax Number (optional): _____

email (optional): _____



Please hand this form in tonight, or mail it to:

Mr. Jonathan Wald, Chief of Environmental Planning
36 CES/CEV
Unit 14007
APO AP 96543-4007

Your letter must be postmarked by **June 27, 2006** to ensure consideration in the Final EIS.

BUREAU OF STATISTICS AND PLANS
(Bureau of Planning)
Government of Guam

Felix Perez Camacho
Governor of Guam

Kaleo Scott Moylan
Lieutenant Governor

P.O. Box 2950 Hagåtña, Guam 96932
Tel: (671) 472-4201/3
Fax: (671) 477-1812

Alberto "Tony" A. Lamorena V
Acting Director

SEP 22 2006

Mr. Jonathan Wald, GS-12
Chief, Natural and Cultural Resources
Department of the Air Force
Headquarters, 36th Wing (PACAF)
Unit 14007, APO AP 96943-4007

Dear Mr. Wald:

The Bureau of Statistics and Plans has completed the review of the Federal Consistency determination which we have received on September 1, 2006 for the Establishment and Operation of an **Intelligence, Surveillance, Reconnaissance, (ISR) and Strike Capability** at Andersen Air Force Base, Guam.

We have coordinated our review of the GCMP Assessment Format with the Government of Guam's development and resource agencies, including the Department of Parks and Recreation (DPR), Guam Environmental Protection Agency (GEPA), Department of Agriculture (DoAg), and Department of Land Management (DLM). These Government agencies have no objections to the proposed establishment and operation of the ISR/Strike capability at the AAFB. However, the Bureau was informed by the DoAg's Division of Aquatic and Wildlife Resources that they still have several issues and concerns that need to be addressed:

1. The clearing of 73.9 hectares of native forest critical to endangered species habitat.
2. The location of proposed 190 family housing units need to be more clearly delineated.
3. Identification of funding base as well as support staff to implement the duties of the Wildlife Manager Specialist.
4. Inclusion of assurances that reintroduction of endangered species to native habitat will not be impeded by the proposed project.
5. The need for the Air Force to ensure that funding for the installation of the snake barrier is made a part of this action.
6. Consider also on the "Noise Impact Study" the potential impact of bats abandoning the Pati Point colony site, and the development of appropriate measure, including offsite mitigation, to offset the impact, if it occurs.
7. Although, DAWR supports the efforts to conduct the Brown Tree Snake trapping and Interdiction and Control, at Pati Point, they feel that it should be coordinated so that not only traps are used, but also the best available techniques and methods are incorporated to minimize impacts to the fruit bats. ITS control (using traps and other methods) should not be done by the Wildlife Management Specialist. It should be contracted to USDA or another qualified agency. Additionally, research scope and direction of NARC efforts should be determined by DOD, Wildlife Services Operations, NWRC, DAWR, and USFWS through annual and multi-year goals with discrete, finite goals.

ISR/Strike AAFB

Page 2

8. Feral cats are detrimental to the recovery of the flightless Guam rail. There's a need to regulate/document the location of family pets, by registering with the Air Force Veterinarian upon arrival at AAFB and also when the owner's leaves/relocate. They should be made responsible in reporting to the veterinarian any transfer of ownership to new owner or death of the pet.
9. DP5. Hazardous Areas states that "Interior noise at the schools could be reduced through mitigative measures." Would Andersen fund the insulation of the schools in the impacted area?
10. Need to ensure that all the mitigation actions are COMPLETELY funded.

The document has indicated that the survey of archaeological resources has not been done, which is the DPR's Historic Preservation Office concern. Section 106 consultation and development of a Memorandum of Agreement is needed for this project. GEPA also has some environmental issues that need to be addressed, such as the water run-off, particularly with regard to impacts on the Guam Aquifer Recharge Area/Northern Water Lens and erosion controls measures planned to curtail proposed construction impacts on Guam's water resources which must be described in detail in the Final EIS. The Federal Consistency determination indicates that the proposed construction activities, including new buildings and utility lines and other related structures will all be within the confines of AAFB, outside of the explosive safety distances surrounding the AAB munitions storage areas. We do appreciate that the Department of the Air Force do recognized that Federal consistency requirement applies when any federal agency activities, including development projects, regardless of location, affects any land or water use or natural resource of the coastal zone, 15 CFR Part 930, Subpart C.

Based on our review of the submitted document and the Department of the Air Force willingness to work closely, in coordinated effort with the Government of Guam, the Bureau concurs that this federal action will be undertaken in a manner consistent with the objectives and enforceable policies of the Guam Coastal Management Program (GCMP), to the maximum extent practicable, in accordance with the Coastal Zone Management Act of 1972 (PL. 92-583) as amended (P.L. 94-370, PL. 104-150, the Coastal Zone Protection Act of 1996). However, please note that this GCMP concurrence does not preclude the need to obtain other Government of Guam and Federal approvals. We will appreciate receiving a copy of the Final EA when it's ready.

Sincerely,



ALBERTO A. LAMORENA V
Acting Director

cc: GEPA
DoAg
DPR
DLM
Bill Millhouser
John Parks

Oral and Written Comments from Agencies, Organizations, and Private Entities and Individuals on Draft Environmental Impact Statement

Comment Tracking Code	Date	Affiliation	Author
Agencies			
A1	June 1, 2006	Government of Guam Department of Parks and Recreation 490 Chalan Palasyo Agana Heights, GU 96910	Ms. Lynda Bordallo Aguon
A2	June 20, 2006	U.S. Department of the Interior Guam National Wildlife Refuge P.O. Box 8134, MOU-3 Dededo, GU 96929	Mr. Chris Bandy
A3	June 22, 2006	Government of Guam Department of Agriculture Aquatic & Wildlife Resources 163 Dairy Road Mangilao, GU 96913	Mr. Paul C. Bassler Director
A4	June 27, 2006	Guam Environmental Protection Agency P.O. Box 22439 GMF Barrigada, GU 96921	Mr. Alejandro D. Soto
A5	June 27, 2006	U.S. Environmental Protection Agency Region IX 75 Hawthorne Street San Francisco, CA 94105-3901	Mr. Duane James Manager, Environmental Review Office
A6	June 30, 2006	U.S. Department of the Interior Office of the Secretary Office of Environmental Policy and Compliance 1111 Jackson Street, Suite 520 Oakland, CA 94607	Ms. Patricia Sanderson Port Regional Environmental Officer
A7	June 27, 2006	Government of Guam Bureau of Statistics and Plans P.O. Box 2950 Hagatna, GU 96932	Mr. Alberto A. Lamorena V, Acting Director

Organizations			
O1	June 26, 2006	Earthjustice 223 South King Street, Suite 400 Honolulu, HI 96813-4501	Mr. David Lane Henkin Staff Attorney
O2	June 27, 2006	Conservation Council for Hawaii Hawaii Affiliate of the National Wildlife Federation P.O. Box 2923 Honolulu, HI 96802	Ms. Marjorie Ziegler
O3	June 25, 2006	Marianas Audubon Society P O Box 4425 Hagatna, Guam 96932	Ms. Gretchen R. Grimm, President
O4	June 1, 2006	Guam Legislature	Senator Joanne M.S. Brown
O5	June 1, 2006	Guam Legislature	Mr. Adolpho Palacios, Member of Guam Legislature
Private Entities/Individuals			
P1	June 4, 2006	Virginia Polytechnic Institute and State University Dept. of Biology College of Arts and Sciences Blacksburg, VA 24061-0406	Mr. Jeffrey R. Walters Bailey Professor of Biology
P2	June 25, 2006	University of Guam College of Natural and Applied Sciences UOG Station Mangilao, Guam 96923	Mr. Dustin Janeke DAWR Research Cooperator
P3	June 26, 2006	Dr. Justine B. de Cruz (address omitted for privacy purposes)	Dr. Justine B. deCruz, Biologist
P4	June 1, 2006	Mr. Antonio Sablan (address omitted for privacy purposes)	citizen
P5	June 1, 2006	Mr. Cole Herndon (address omitted for privacy purposes)	citizen
P6	June 1, 2006	Mr. Cole Herndon (address omitted for privacy purposes)	citizen

Cross Reference Index by Comment Tracking Number

Andersen AFB Draft Environmental Impact Statement July 2006

Comment No.	Summary Comment	Comment Response
A1-Department of Parks and Recreation SHPO		
A1-01	...the document does not show the locations of sites from archaeological surveys conducted on the base over the past years, or discuss possible impacts due to their proximity to the proposed actions.	This comment addresses the adequacy of the EIS. The analysis in the FEIS was improved and modified by updating Subchapters 1.2.5 and 4.9.1 to reflect the completion of a cultural resources survey as well as the concurrence from the GSHPO that no further archaeological work will be necessary, thereby completing Section 106 consultation.
A1-02	Figure 3.9-2 shows neither the Tarague District nor the Jinapsan Complex, although these are referenced in the text.	This comment addresses the adequacy of the EIS. Figure 3.9-2 of the FEIS was improved by adding the Tarague District and Jinapsan Complex.
A1-03	Table 3.9-3 doesn't list recent work by IARII, MARS and PHRI although partially referenced in the text.	This comment addresses the adequacy of the EIS. The FEIS was improved and modified by updating Subchapter 3.9.2 with an additional paragraph to reflect the work identified in the comment.
A1-04	Page 3-71 , line 13, references "a shelter of collapsed wood and metal which was built after the Chamorro had been contacted by the Spanish" is curiously vague. Just what is being referenced here, a structure from the late 1600's, one from the decades prior to WWII, or?	This comment addresses the adequacy of the EIS. The FEIS was improved and modified by deleting this paragraph from Subchapter 3.9.2 of the FEIS because it did not pertain to the ISR/Strike project area.
A1-05	Page 3-71 , line 36, references "areas of high potential for...cultural materials," these should be shown on a map.	This comment addresses the adequacy of the EIS. The FEIS was improved and modified by deleting the sentence from Subchapter 3.9.2 of the FEIS because it summarized the preceding paragraph, which was deleted.
A2-U.S. Fish & Wildlife Service – Guam National Wildlife Refuge		
A2-01	The cumulative impacts of these projects and future actions will negatively impact the Overlay Refuge and the species dependent upon it.	This comment addresses the adequacy of the EIS. As discussed in Subchapter 4.5.5, implementation of the conservation measures in Subchapter 2.2.1.2 for the ISR/Strike action and in Subchapter 2.4.2.2 (Northwest Field action) would minimize the potential for negative impact to the Overlay Refuge and the species dependent on it.

A2-02	On page 2-5 , line 40, the statement should read “ Part of Andersen AFB is within the Guam....	This comment addresses the adequacy of the EIS. The FEIS was improved and modified as suggested by the commenter by revising the sentence as suggested in Subchapter 2.2.
A2-03	On page 3-49 , line 6, the statement should read “the strand of vegetation along the....	This comment addresses the adequacy of the EIS. The FEIS was improved and modified as suggested by the commenter by revising the sentence in Subchapter 3.5.3.2 as suggested.
A2-04	There are only 371 terrestrial acres in the Ritidian Unit of the Guam NWR. The statement on page 3-56 , line 30, should be corrected.	This comment addresses the adequacy of the EIS. Subchapter 3.5.3 of the FEIS was improved to reflect 150 hectares (371 acres).
A3-GovGuam – Dept. of Agriculture		
A3-01	The Department prefers the No Action Alternative as this action imposes the least impact to the natural resources as they relate to Threatened and Endangered (T&E) species.	Comment noted.
A3-02	A family-housing complex in Figure 2.2-3 (p. 2-15) will be constructed in forested area (1.5 ha), but Figure 3.2-1 shows that the housing complex will not be in forested habitat. The final EIS should include that correction.	This comment addresses the adequacy of the EIS. Figure 2.2-3 of the FEIS was improved to show that the housing complex would not be located in forested habitat. Additionally, Subchapter 2.2.1.2 of the EIS was improved by stating that the location reflects results of a June 2005 reconnaissance survey involving Air Force and DAWR staff.
A3-03	We view the loss of 122 hectares as impacting the recovery and preservation of Guam’s native wildlife, especially the federally endangered Mariana crow, Micronesian kingfisher, and threatened Mariana fruit bat.	This comment addresses the adequacy of the EIS. The conservation measures stated in Subchapter 2.2.1.2 of the FEIS were tailored to correspond to the USFWS recovery plans for the Mariana crow, Micronesian kingfisher, and Mariana fruit bat. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project “...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA.”

A3-04	<p>Though mentioned briefly (pg 1-3) the relocation of 8,000 Marines from Japan to Guam emphasizes the need to reevaluate the cumulative effects of all projects in the foreseeable future.</p> <p>Therefore, we recommend that the Air Force wait to finalize the draft EIS until this information is available so that the cumulative impacts can be adequately addressed.</p> <p>The amount of area to be affected by all actions could increase significantly further impeding the recovery of T&E species.</p>	<p>This comment addresses the adequacy of the EIS. The Air Force has declined to wait two years to modify the analysis in the EIS as suggested by the commenter because Subchapter 1.2.1 already describes the unavailability of the information needed to assess the cumulative impacts of the other action identified in the comment. The Air Force would be required to fully evaluate the cumulative effects (or impacts) of related proposed actions, e.g., Marines moving to Guam from Japan, that can be meaningfully evaluated. However, any plans the Marines may have to move from Japan to Guam have not been settled and are still under development. Additional planning and programming is needed regarding the relocation of Marines to Guam, and it will be about two years before the environmental assessment for the relocation of the Marines is complete. Consequently, the Air Force would expect the Marine Corps to capture the cumulative impacts (or effects) of their proposed actions along with this proposed action in their separate environmental assessment when their actions are fully vetted and known. The Air Force recognizes there has been speculation in the press regarding the potential Marine Corps move to Guam. However, Air Force and Marine Corps discussions have indicated that these stories are only speculation and nothing has been finalized.</p> <p>In addition, the Air Force does not consider the unavailable information regarding relocation of Marines to Guam to be essential to any reasoned choice among alternatives for the ISR/Strike establishment and operation. Further, even if such information would be relevant to significant adverse impacts and a choice among alternatives, the Air Force considers the cost of a two-year delay to obtain that information for this EIS to be exorbitant.</p>
A3-05	<p>The proposed activities would place the airfield activities much closer to the cliffline areas where future recovery efforts will be focused.</p>	<p>This comment addresses the merit of the alternative. The conservation measures in Subchapter 2.2.1.2 that are part of the proposed action would offer better quality endangered species recovery sites than the current sites that would be cleared for the ASA or subjected to intensified aircraft operations (<i>i.e.</i>, overflight).</p>
A3-06	<p>The area impacted by the proposed activities when considered in conjunction with the footprint of noise levels could be significantly greater as a result of the increased level of aircraft traffic as airfield operations are projected to increase from 234 to 397 flights per day.</p>	<p>This comment addresses the adequacy of the EIS. The adaptive management strategy described in Subsection 2.2.1.2 would incorporate noise studies to monitor effects on listed species (also see response to A3-07). The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."</p>

A3-07	Though habituation of fruit bats to noise is perceived as most likely to occur, the Draft EIS cites a study of megachiropteran (p. 4-62). There may be differences in tolerances to noise levels between the species, and also, Mariana fruit bats are known to fly from the island of Rota to Guam, providing a source for the Guam population. It is unknown if bats would stay in the area with the increase in noise due to aircraft.	This comment addresses the adequacy of the EIS. Implementation of the adaptive management conservation measure described in Subchapter 2.2.1.2 would close the data gap identified in the comment. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."
A3-08	The final EIS should discuss how the wildlife management specialist would be fully equipped with staff and funding to implement the management actions mentioned in the conservation measures.	This comment addresses the adequacy of the EIS. When the Air Force makes its decisions, the Air Force will prepare a Record of Decision (ROD), which addresses mitigation commitments. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
A3-09	Ungulate eradication will require a professionally designed and implemented plan. It is strongly advised that outside expertise is utilized to write and help implement this plan.	This comment addresses the merits of the alternative. The conservation measure in Subchapter 2.2.1.2 of the FEIS defines development of the ungulate management plan. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
A3-10	Area 50 is listed in Andersen AFB's INRMP and we would suggest the Final EIS discuss how the Air Force intends to implement the objectives of the Area 50 project since the proposed action excludes its implementation at its current site.	This comment addresses the adequacy of the EIS. Area 50 is not a conservation measure associated with the ISR/Strike proposal. Area 50 is mentioned in the introduction of the Northwest Field conservation measure in Subchapter 2.4.2.2 to help the reader understand the purpose of the new HMU, which is a Northwest Field action conservation measure considered for cumulative impacts. As stated in Subchapter 2.4.2.2, there would be no change to the use of Area 50.
A3-11	We would like to see in the Final EIS a more detailed plan of: 1) how ungulate impacts will be controlled,	This comment addresses the adequacy of the EIS. Through implementation of the conservation measure in Subchapter 2.2.1.2, DAWR, USFWS GNWR, USFWS Ecological Services, USDA WS, and other interested entities would be included in development of the plan. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
A3-12	2) plans to provide hunting opportunities in other DoD sites to compensate for the loss of hunting opportunities,	This comment addresses the adequacy of the EIS. The Air Force cannot commit to the use of non-Air Force property.

A3-13	and 3) the potential impact of displaced ungulates on other areas of Andersen AFB.	This comment addresses the adequacy of the EIS. Subchapter 4.5.1.2 analysis addresses the impact of displaced ungulates; the Wildlife Management Specialist conservation measure in Subchapter 2.2.1.2 describes how ungulates would be controlled. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
A3-14	We recommend that the Air Force work with the USDA-WS and the USFWS cooperatively to develop a mechanism that will estimate the costs for Wildlife Services BTS interdiction efforts at a 100% level on AAFB 18 months in advance to provide consistent and reliable funding.	This comment does not address the merits of the alternatives or the adequacy of the EIS. However, when the Air Force makes its decisions, a Record of Decision (ROD), which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
A3-15	We maintain that regulation protocols 505 and 506 should be incorporated into the AAFB Brown Tree Snake Control Plan and are appendix [sic] to the Final EIS document.	This comment addresses the adequacy of the EIS. The DTRs are referenced indirectly in the SECDEF reply to Senator Inouye. Although protocols 505 and 506 are not incorporated into the Control Plan and Final EIS, as stated by the Secretary of Defense in his letter to Senator Inouye (contained in Appendix B of the BA in Appendix E to the FEIS), 100% inspection is ensured.
A3-16	We recommend that the Final EIS include the following mitigation actions in addition to those mentioned in the Draft EIS: 1. The Wildlife Management Specialist should be fully funded and equipped with adequate staffing.	This comment addresses the adequacy of the EIS. When the Air Force makes its decisions, a Record of Decision, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
A3-17	2. The Air Force [should] adequately mitigate for the loss of native limestone forest. We recommend that the areas proposed for clearing during the second phase of the MSA Igloo project and areas subject to disturbance associated with training in the Northwest Field and ISR/Strike project (e.g., forest adjacent to the proposed aircraft staging area under the proposed ISR/Strike project) be assessed in the cumulative impacts and appropriately mitigated.	This comment addresses the adequacy of the EIS. The planning process for Phase II of the MSA project is very preliminary and is not yet to the point where details are adequate or needed for inclusion in the cumulative impacts analysis of the ISR/Strike EIS. Additionally, as stated in Subchapter 4.5.5, the amount of vegetation subject to clearing is 122.7 hectares. However, conservation measures as part of the ISR/Strike action and other actions would initiate active land management practices on 336 hectares.
A3-18	3. Consideration [should be given] to realigning the enclosure fencelines to follow existing roads [to] minimize, if not eliminate, the need for any more clearing.	This comment addresses the adequacy of the EIS. The Air Force improved the conservation measure in Subchapter 2.2.1.2 as suggested by the commenter by adding text that described the factors that were considered when developing the fence lines for the proposed ungulate enclosure areas. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."

A3-19	4. We suggest that the research scope and direction of NWRC efforts be determined by DoD, Wildlife Services Operations, NWRC, DAWR, and Service staff through annual and multi-year goals with discrete, finite goals.	This comment addresses the adequacy of the EIS. When the Air Force makes its decisions, a Record of Decision, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
A3-20	5. We are concerned about the level of disturbance that trapping of brown tree snakes at Pati Point may cause to the fruit bat colony. It is therefore imperative that new control techniques be developed for brown tree snake control at the bat colony.	This comment addresses the adequacy of the EIS. The conservation measure in Subchapter 2.2.1.2 includes Air Force cooperation with other agencies to determine the most appropriate techniques to control BTSs at Pati Point. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
A3-21	6. We believe there is not enough information available to assume these measures [a study on the effects of aircraft noise on Mariana fruit bats and Mariana crows] will be effective.	This comment addresses the adequacy of the EIS. Subchapter 2.2.1.2 contains two conservation measures (noise study and adaptive management) that would be implemented to deal with the data gap. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
A3-22	6. We recommend that the Air Force consider the potential impact of bats abandoning the Pati Point colony site and develop appropriate measures, including offsite mitigation, to offset this impact if it occurs.	This comment addresses the adequacy of the EIS. The Air Force improved and modified the FEIS by including the Incidental Take Statement issued by the USFWS in its Biological Opinion, which considered colony abandonment, as a new Subchapter 4.5.1.4. Additionally, reference to the non-discretionary terms and conditions from the BO were included as mitigation in Subchapter 4.5.4 of the FEIS. The BO was included in Appendix E of the FEIS. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."
A3-23	7. Vegetation surveys relevant to [the] recovery of Mariana fruit bat and Mariana crow should include funding not only to conduct surveys but also provide funding for implementing corrective actions to improve remaining habitat important to T&E species.	This comment addresses the adequacy of the EIS. When the Air Force makes its decisions, a Record of Decision, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.

A3-24	8. The final EIS should include further assurances that reintroduction of endangered species to native habitat will not be impeded by the proposed action.	This comment addresses the adequacy of the EIS. Implementation of the conservation measures described in Subchapter 2.2.1.2 would reverse the continued degradation of important habitat, and therefore, contribute to the recovery actions associated with the reintroduction of listed species. Additionally, the conservation measures stated in Subchapter 2.2.1.2 of the FEIS were tailored to correspond to the USFWS recovery plans for the various bird species and the recovery plans. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
A3-25	9. With regard to the HMU, the Air Force needs to ensure that it will fund the completion of the snake barrier around this site.	Comment noted. When the Air Force makes its decisions, Record of Decision, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
A3-26	10. With the increase of stationed personnel on AAFB, we strongly recommend a greater accountability with regard to family pets.	This comment addresses the adequacy of the EIS. The Air Force improved the <i>Introduced Terrestrial Species</i> section of Subchapter 4.5.1.2 by stating the base will utilize the Armed Forces Pest Management Board Technical Guide No. 37, <i>Guidelines for Reducing Feral/Stray Cat Populations on Military Installations in the United States</i> . Subchapter 4.5.1.2 also was improved by including guidance for the control of pets.
A3-27	We recommend the Air Force evaluate all potential actions by Federal agencies in the final EIS. For example, the Army Corps of Engineers (ACOE) is reviewing a permit to build an access road to the Jinapsan Beach area from Tarague Beach. This action was not included in the draft EIS even though it does have the potential to impact natural resources in northern Guam.	This comment addresses the adequacy of the EIS's cumulative impacts analysis. The analysis in Subchapter 1.2.1 addresses cumulative impacts of the Navy's Wharf expansion project and the unavailability of information concerning other DoD Actions. The Air Force modified the portion of that analysis that indicates that GovGuam identified no past, present, or reasonably foreseeable future actions to include the ACOE bridge permit action referenced by the Department of Agriculture.
A3-28	Page 1-4 , line 36-40, detailed info on flight training is unavailable at this time.	This comment addresses the adequacy of the EIS. Subchapter 1.2.2 was modified and improved to explain that the Air Force is deferring its decisions on potential range utilization issues to a future decision point when those matters will be "ripe" for decision. Those future training decisions will be based on a Navy EIS (of which the Air Force is a cooperating agency) that will fully evaluate military training operations in the Mariana Islands..
A3-29	Page 2-26 , Table 2.2-5, the unit of measure is not indicated in the table; it appears to be hectares.	This comment addresses the adequacy of the EIS. The Air Force improved Table 2.2-8 (formerly Table 2.2-5) of the FEIS to show hectares as the unit of measure in the column heading.

A3-30	Page 2-26 , lines 10-12, reference is made to Figure 2.2-6 to facilities in the Commercial Gate area. The figure does not indicate where the facilities will be positioned, nor if the area will be cleared.	This comment addresses the adequacy of the EIS. The analysis in the EIS assumes that the entire area within the Commercial Gate Area will be cleared (the environmentally extreme condition), although 100% clearance is unlikely. Additionally, the figure shows potential positions for facilities at the gate and the truck inspection station based on the requirements for the facilities and preliminary site planning.
A3-31	Page 2-43 , figure 2.4-1, the figure indicates that the Combat Arms Training and Maintenance Facility (Project 13, also Table 2.4.-1) is outside the location of the figure, but there is no indication where it will be located. We recommend that additional information about the location of the proposed Combat Arms Training and Maintenance Facility be included in the final EIS.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by showing the location of the CATM project on Figure 2.4-2 and removing the note on Figure 2.4-1. A footnote was added to Table 2.4-1 advising that the location of the CATM is shown on Figure 2.4-2.
A3-32	Page 2-58 , Subchapter 2.4.3. We recommend that additional information about Transportable Airlift Control Element Unit and Logistics Unit be included in the final EIS. The draft EIS provides information on the number of personnel and states no construction will occur, but does not provide on whether the operations or training associated with this unit will impact biological resources.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by adding text to Subchapter 2.4.3 that TALCE and Logistics unit training would be accomplished within existing facilities.
A3-33	Page 3-25 , line 30-31. Correct scientific name of ifit from <i>Intsia bijunga</i> to <i>Intsia bijuga</i> , and faniok from <i>Trisiropis obtusangula</i> to <i>Tristiropsis obtusangula</i> .	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising text in Subchapter 3.5. 1 with the information in the comment.
A3-34	Page 3-26 , Table 3.5-1. <i>Chomolina</i> should be corrected to <i>Chromolaena</i> .	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by correcting Table 3.5-1.
A3-35	Page 3-28 , line 9, correct spelling of scientific name from <i>Luecanaea</i> to <i>Luecaena</i> . Also, the local name for this plant is Tangantangan, while Haole Koa is the local name used in Hawaii.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising text in Subchapter 3.5. 1 with the information in the comment.
A3-36	Page 3-28 , line 23, correct spelling of <i>I. bijunga</i> to <i>I. bijuga</i> .	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising text in Subchapter 3.5.1 with the information in the comment.
A3-37	Page 3-28 , Table 3.5-3. Remove “)” after <i>Ixobrychus sinensi</i> .	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising Table 3.5-3 as suggested.

A3-38	Page 3-29 , line 1. Replace name of crow from “Marina” to “Mariana.”	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising text in Subchapter 3.5.1 with the information in the comment.
A3-39	Page 3-44 , line 5. Remove double punctuation at the end of line.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising text in Subchapter 3.5. with the information in the comment.
A3-40	Page 3-44 , line 20. Place a period after the “S” in “ <i>S. Nelsonii</i> .”	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising text in Subchapter 3.5.3.1 with the information in the comment.
A3-41	Page 3-50 , line 3-4. Rail main captive population is on Guam. Micronesian kingfishers are also being bred on Guam.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising text in Subchapter 3.5.3.2 with the information in the comment.
A3-42	Page 3-50 , line 24-25. Prior to 2005, only the Mariana fruit bat population on Guam was federally listed. The statement that the population in the Commonwealth of the Northern Mariana Island was listed as threatened when the Guam population was listed as endangered is incorrect.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising text in Subchapter 3.5.3.2 with the information in the comment.
A3-43	Page 3-51 , line 5. Brooke 2006 is cited but in the reference, page 8-1, it is cited as Brooke 2005. There needs to be consistency with the references.	This comment addresses the adequacy of the EIS. The reference on page 3-51 is accurately presented on page 7-2 of the EIS. The page 8-1 mentioned in the comment is the reference listing for the BA, which is Appendix E to the EIS.
A3-44	Page 3-52 , lines 38-39. The Guam Micronesian kingfisher was recorded along the survey transect (transect nine) next to the proposed aircraft staging area in 1981, therefore kingfishers likely utilized the vegetation proposed for clearing in the project area. If the Air Force is defining this area as Andersen main, then the statement about kingfishers not being present in 1981 is incorrect.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising text in Subchapter 3.5.3.2 with the information in the comment.
A3-45	Page 4-59-60 , Table 4.5-4. The estimated Mariana crow suitable habitat that will be cleared is presented as approximately half the amount of suitable Mariana fruit bat habitat even though they both include the same vegetation types. We believe the estimated suitable Mariana crow habitat should be equal to the current estimate of suitable Mariana fruit bat habitat in the final EIS.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising Table 4.5-4 to show that the amounts of suitable habitat for Mariana fruit bats and Mariana crows are equal. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project “...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA.”

A3-46	<p>Page 4-61, lines 25-29. The assessment of project impacts on Mariana fruit bat habitat does not include an assessment of indirect habitat loss due to human disturbance activities. Forested areas adjacent to the proposed aircraft staging area will be exposed to human activity that may limit the potential of these forests to support the long-term conservation of the Mariana fruit bat. We recommend that these indirect impacts and associated acreage also be included in the assessment on potential habitat loss for this species.</p>	<p>This comment addresses the merits of the alternatives and the adequacy of the EIS. The FEIS was improved and modified as suggested by replacing the data in Table 4.5-4 related to direct and indirect habitat loss with the indirect and direct habitat loss from the USFWS Biological Opinion. Additionally, text in the DEIS that related to Table 4.5-4 was revised in the FEIS to agree with the updated data in the table. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."</p>
A3-47	<p>Page 4-65, lines 22-34. The assessment of project impacts on Mariana crow habitat does not include an assessment of indirect habitat loss due to human disturbance activities. Forested areas adjacent to the proposed aircraft staging area will be exposed to human activity, including aircraft noise that may limit the potential of these forests to support the long-term conservation of the Mariana crow. We recommend that these indirect impacts and associated acreage also be included in the assessment on potential habitat loss for this species.</p>	<p>See response to comment A3-46.</p>
A3-48	<p>Page 4-67, lines 30-34. The assessment of project impacts on the Guam Micronesian kingfisher does not include an assessment of loss of the habitat needed to support the recovery of the species on Guam.</p>	<p>This comment addresses the adequacy of the EIS. Implementation of the conservation measures described in Subchapter 2.2.1.2 would reverse the continued degradation of important habitat, and therefore, contribute to the recovery of the kingfisher. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."</p>
A3-49	<p>Page 4-74, line 2-5. DAWR has observed nest site fidelity in nesting pairs both on Guam and Rota when these nesting pairs experience nest success. The lack of nest site fidelity may be due to the lack of nesting success.</p>	<p>This comment addresses the adequacy of the EIS. The text in Subchapter 4.5.5 to which the comment refers has been improved to reflect that the lack of nest site fidelity may be due to nest failures.</p>
A4-Guam EPA		
A4-1	<p>It is imperative that the Air Force identify all CERCLA sites and ensure that this project does not negatively impact or delay clean up of CERCLA/MMRP sites, e.g., restricting access to perform restoration activities.</p>	<p>This comment addresses the adequacy of the EIS. The last paragraph of Subchapter 4.8.1.3 of the EIS addresses this comment.</p>

A4-2	All new water used for industrial and aircraft use shall be sent to the wastewater treatment plant. No surface discharge of water from oil/water separator shall be allowed. Wastewater systems upgrades and individual wastewater disposal systems must comply with Guam EPA Wastewater Regulations.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising the second paragraph of Subchapter 2.2.1.2 and the first paragraph of Subchapter 4.4.1.2 of the EIS with the information in the comment.
A4-3	Upgrades to stormwater systems will be required to accommodate any additional increases to the capacity of the system.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising Subchapter 4.4.1.4 of the EIS with the information in the comment.
A4-4	The Agency requires that prior to underground recharge, stormwater is pretreated for the initial portion of the storm event to treat and capture any contaminants in the runoff in accordance with the Agency's new Stormwater Management Manual.	See response to A4-3.
A4-5	Approximately 174.5 acres of impervious surfaces will need pretreatment prior to discharge into dry wells. Guam EPA requires that all stormwater be addressed on-site whenever possible.	See response to A4-3.
A4-6	Section 3.6 – Statement is made that infiltrating ground water is relatively free from Point Source Contamination. Please provide supporting data.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising the second paragraph of Subchapter 3.6 of the FEIS with supporting text as suggested by the commenter.
A4-7	Section 3.6 – Infiltrating ground water is not “naturally filtered” by hundreds of feet of limestone; this may be inaccurate.	See response to comment A4-6.
A4-8	The Air Force is encouraged to contact affected schools and provide technical information on sound-proofing buildings, provide sound-proofing materials, and/or grant monies to mitigate the noise impacts to off-base schools by the proposed activity.	This comment addresses the adequacy of the EIS. Subchapter 3.2 was improved by better explaining how the AICUZ program works, to include how recommendations of the AICUZ study should be used by the local community to plan, zone, and mitigate aircraft noise.
A4-9	Clearing and grading activities will require Guam EPA permits.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by adding text to Subchapter 1.2.5 that clearing and grading permits would be required.
A4-10	Vegetative waste should be composted, mulched and diverted from the waste stream going to the facility.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by inserting text as the sixth paragraph in Subchapter 4.4.1.5 based on the information in the comment.

A4-11	An Environmental Protection Plan (EPP) is required for clearing and grading activities.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising existing text or inserting new text in Subchapters 1.2.5, 2.2.1.2, and 4.5.1.
A4-12	Prior to commencement of earthmoving activities, local government clearances from the Department of Agriculture, Department of Parks and Recreation, Historic Preservation Office must also be obtained.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by revising existing text or inserting new text into Subchapters 1.2.5, 4.5.1, and 4.6.1 to incorporate the action identified in the comment.
A4-13	Table 2.2-5, Proposed Forest Habitat Clearing. The table needs to identify the measurement units.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by showing hectares as the unit of measure in Table 2.2-5.
A4-14	Should the demolition and hardfill be disposed outside of AAFB, the current inventory of permitted hardfill sites must be evaluated if they can accommodate the estimated quantities.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by including the measures in Subchapters 3.4.5 and 4.4.1.5 that the Air Force has taken to deal with solid waste issues since the DEIS was available for review.
A4-15	Housing facilities for temporary workers (barracks) should be discouraged if the facilities are not in a compatible land use surroundings and are not supported by the availability of adequate infrastructure to the local community.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by using the provided text in Subchapter 4.2.1.
A5-EPA, Region 9		
A5-01	We have concerns regarding the project's proposal to substantially increase the amount of wastewater flowing to the GWA WWTP.	This comment addresses the adequacy of the EIS. As indicated in Subchapter 4.4.1.2, the resultant wastewater flow at the treatment plant would be 9.9 mgd (a 0.4 mgd, 4 percent increase above the current condition), which equates to approximately 82 percent of capacity.
A5-02	It is not clear whether GovGuam will issue permits for the landfill expansion needed for the project, especially since it is located over a Sole Source Aquifer. More discussion is needed in the EIS to address aquifer contamination concerns and permitting limitations.	This comment addresses the adequacy of the EIS. The fourth paragraph of Subchapter 4.4.1.5 was improved and expanded to discuss the information in the comment.
A5-03	We understand that full details for other DoD projects are not yet known. However, the Air Force should attempt a cumulative impacts assessment based on information that is known and acknowledge the uncertainty, consistent with the CEQ guidance.	See response to A3-04 and A3-27.

A5-04	We request additional information be included in the Final EIS regarding resource use by the needed 1,800 migrant construction laborers.	This comment addresses the adequacy of the EIS. The analysis in the FEIS was improved and modified by further analyzing the matters noted in this comment in Subchapters 4.2.1, 4.4, 4.10.1.1, and 4.10.2.1 to state that the optimal sites for temporary housing for these laborers would likely be those that have existing utility systems with verifiable capacities.
Wastewater Treatment		
A5-05	The Final EIS should identify probable sewage disposal locations and calculate the amount of wastewater that would be generated by the migrant workers required for the project. Include this estimate in the infrastructure impact analysis and update the percent capacity of the WWTP for the project and cumulative impact analysis accordingly.	See response to comment A5-04.
A5-06	EPA requests that the Final EIS identify what percentage of GWA's total flows originate from Andersen AFB, and how that percentage will change as a result of the proposed project.	This comment addresses the adequacy of the EIS. Subchapter 3.3.4 of the EIS presents the total flows and percentage of GWA's total flows attributed to Andersen AFB. Also, Subchapter 4.4.1.2 of the EIS contains a description of the percentage of change.
A5-07	We also request a current volume estimate of toxic loadings for EPA's 126 priority pollutants and how that volume will change as a result of the proposed project.	This comment addresses the adequacy of the EIS. The analysis in the FEIS was improved and modified by considering and further analyzing the issues in this comment by expanding the first paragraph of Subchapter 4.4.1.2 to state that all wastewater systems upgrades and individual wastewater disposal systems would comply with Guam EPA Wastewater regulations.
A5-08	The Final EIS should also include a review of GWA's draft Water Resources Master Plan for compatibility. These discussions should include the impact the increase wastewater flow will have on GWA's 301(h) permit renewal and whether upgrades to secondary wastewater treatment will be needed.	This comment addresses the adequacy of the EIS. The analysis in the FEIS was improved and modified by considering and further analyzing the issues in this comment by expanding the second paragraph of Subchapter 4.4.1.2 to include data from the draft Water Resources Master Plan and GWA's 301(h) permit.
A5-09	The Air Force should select Alternative B, which would lessen the increase in wastewater generation.	This comment addresses the merits of an alternative. Thank you for your comment. The Air Force will take this into consideration in its decision-making process.
A5-10	The project should also include an upgrade or replacement of the collection system components that are causing raw sewage overflows into yards and the storm runoff system....	This comment addresses the adequacy of the EIS. The FEIS was improved by modifying the fourth to the last paragraph of Subchapter 3.4.2 to reflect the Base wastewater system repairs and evaluation.
A5-11	In the final EIS, identify what action will be taken to ensure automatic overflow notifications to utilities personnel.	See response to comment A5-10.

Cumulative Impacts Analysis		
A5-12	Modify the cumulative impacts analyses to include a discussion of potential impacts from the Navy and Marine Corps projects planned for Guam. Utilize information in the DoD Master Plan for Guam, expected in July 2006, that will address military buildup and expansion activities. Where specific information is lacking, utilize general qualitative information and/or estimations based on information that is known.	See responses to comments A3-04 and A3-27. The Air Force recognizes that future actions are planned for Guam; however, the Air Force will not attempt to speculate on issues that have not been finalized and that are not capable of meaningful analysis. As the comment suggests, the Guam Integrated Military Development Plan was released during July 2006, after publication of the ISR/Strike DEIS. However, that plan is not a final proposal for action; it is a preliminary plan. Additional planning is needed that could take about two years. During that time, a Joint Program Office will be interfacing with GovGuam and the public during before site-specific actions are finalized.
A5-13	Similarly, include impacts that could be expected from the Air Force's electricity-generating wind turbines at Andersen AFB, especially in relation to birds and bats (p. 1-3), and impacts expected from the munitions storage igloos (p. 2-42).	This comment addresses the adequacy of the EIS. The wind turbine text in Subchapter 1.2.1 of the DEIS was deleted from the FEIS because as of May 2006 this project was not currently being pursued; consequently, wind turbine issues are not within the scope of the issues to be analyzed.
A5-14	Include past actions to the extent they impact resources, such as the existing level of habitat fragmentation.	This comment addresses the adequacy of the EIS. The analysis in the FEIS was improved by revising the text of Subchapter 4.5.1 to reflect past land uses, to include commercial harvest of Ifit.
Noise Impacts		
A5-15	Identify significance criteria for the analysis of noise impacts in the Final EIS. We recommend that EPA's recommended DNL of 55 dBA for residences, schools and hospitals be used.	This comment addresses the adequacy of the EIS. The criteria are listed at the beginning of the noise section of Chapter 4 and include the factors considered. Additionally, text in Subchapter 3.1.1 discusses why the Air Force uses DNL 65 dBA for impact analysis. The analysis in the FEIS was improved and modified by further analyzing the issues noted in the comment by adding text to Subchapters 2.2.1.1 and 4.1.1.1 that states that all new on-Base residential and public use buildings will be designed and constructed to comply with the appropriate NLR standards to achieve an indoor noise level of DNL 45 dBA or less.
A5-16	Estimate the DNLs for the 10 analysis points under Alternative B, and include in Table 4.1-2 .	This comment addresses the adequacy of the EIS. The analysis in the FEIS was improved and modified by considering and further analyzing the issues in this comment by revising the third sentence of the second paragraph of Subchapter 4.1.2 to state that the SEL at analysis points would be identical to Alternative A because the aircraft flight tracks would be the same. Additionally, Figure 4.1.-4, which compares the Alternative A and Alternative B contours, was added to the noise analysis for Alternative B.

A5-17	Commit to the following mitigation in the Final EIS: Retrofit all on- and off-based schools with appropriate measures to achieve new classroom acoustics standard of ANSI as identified on pg. 4-20 .	This comment addresses the adequacy of the EIS. The analysis in Subchapters 2.2.1.1 and 4.1.1.1 of the FEIS was improved and modified by stating that the ANSI standard would be implemented when constructing the new high school and when existing schools on Andersen AFB are modernized. The Air Force declined to revise the EIS as suggested by the commenter relative to retrofitting off-base schools because, when the Air Force makes its decisions, a Record of Decision, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force. The Air Force does not have the authority to add noise attenuation in facilities that are not on Air Force property.
A5-18	Construct all new schools on the AFB to the ANSI classroom acoustics standard.	See response to A5-17.
A5-19	Provide a funding mechanism for off-base residences within the new 65+ dBA noise contours under the project, to be used for noise reduction mitigation measures....	See response to A4-8.
Biological Resources		
A5-20	We understand that the construction footprint has already been altered to reduce clearance in intact forest (p. 2-28). We are confident Air Force planners have the skill to further adjust the footprint to protect the patches of higher quality habitat (totaling 3.5 acres), and to realign the road from a perimeter concept to one within the area already to be cleared for the ASA.	Thank you for your comment. Based on the process described in the first conservation measure in Subchapter 2.2.1.2, further adjustment is not possible due to the facility requirements for the ASA. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
A5-21	The Final EIS should also provide a map that identifies the locations of the 3.5 acres of higher quality forest.	This comment addresses the adequacy of the EIS. Figure 3.5-2 shows locations of " <i>Neisosperma-Macaranga</i> " forest, a vegetation community type that contains the relatively more intact habitat parameters associated with a higher quality forest.
A5-22	The Final EIS should provide more information regarding [the adaptive management strategy], preferably including the strategy as an attachment to the Final EIS.	This comment addresses the adequacy of the EIS. The Air Force improved the adaptive management conservation measure in Subchapter 2.2.1.2 of the EIS by inserting information on an adaptive management working group. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."

A5-23	The Air Force plans to carry out 100% inspection [for BTSs] of out-bound craft and states that all aircraft, military or civilian, taking off from Andersen AFB will be inspected by the U.S. Department of Agriculture to the maximum extent possible. However, it does not indicate whether or how shipments that originated from Andersen AFB but depart from other ports will be inspected. The Final EIS should identify how this control will occur, identify the appropriate funding levels needed to accomplish this task, and indicate whether this funding will occur as part of the project.	This comment addresses the adequacy of the EIS. Chapters 3, 4, and 5 of the 36 Wing Instruction 32-7004, <i>Brown Tree Snake Management</i> (see Appendix C to the BA, which is Appendix E of the EIS), define the inspection procedures for aerial port, munitions, and TMO shipment inspections, respectively. When the Air Force makes its decisions, a Record of Decision, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
A5-24	The Draft EIS notes that the conservation measures identified for this project are sometimes the same as those already identified for the concurrent Northwest Field Training project previously analyzed in an Environmental Assessment. We recommend any conservation measures identified for the Northwest Field Training project also be included as mitigation measures in the ROD for this project. This would include the creation of a new HMU for ecological studies.	This comment addresses the adequacy of the EIS. The cumulative analysis in Subchapter 4.5.5 of the EIS addresses the Northwest Field conservation measures. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
A5-25	The preferred Alternative A includes development of 190 units of family housing. According to Figures 3.5-5 and 2.2-3, this housing would be located in the overlay refuge. We recommend Alternative B which avoids these impacts while still meeting the project purpose and need. If the Air Force selects Alternative A, we recommend relocating housing to an area within the existing developed footprint.	Please see response to comment A3-02.
Solid Waste		
A5-26	In the Final EIS, provide an update on discussions with GovGuam regarding the landfill expansion. Indicate the likelihood of obtaining the necessary permits from GovGuam for a landfill expansion project on Andersen AFB to serve until 2009 and possibly beyond.	This comment addresses the adequacy of the EIS. The FEIS was improved and modified by adding a paragraph to Subchapter 4.4.1.5 that reflects that Andersen AFB would submit a permit and coordinate the landfill expansion and ISR/Strike landfill projects with the Guam EPA.
A5-27	Identify impacts to the Sole Source Aquifer from the existing and future landfill operations.	This comment addresses the adequacy of the EIS. The FEIS was improved and modified by identifying the Sole Source Aquifer in Subchapter 4.4.1.5 and revising the analysis accordingly.
A5-28	Identify the probable disposal location for waste generated by the 1,800 migrant laborers, both on and off-base.	Please see response to comment A5-04.

A5-29	Provide information on the existing residential recycling program, including the current recycling rate.	This comment addresses the adequacy of the EIS. The FEIS was improved and modified by expanding the text in Subchapter 3.4.5 to include information on the base recycling program and current recycling rate and recycling efforts.
A5-30	Indicate whether the waste generation rate includes recycling efforts.	See response to A5-29.
A5-31	Identify what actions are needed to increase the recycling rate on the Base, and include waste diversion goals and timeliness.	See response to A5-29.
Water Supply/Groundwater Recharge		
A5-32	In the Final EIS, include water consumption by the migrant labor force in the calculation of consumption for the project and in the cumulative impacts analysis.	Please see response to comment A5-05.
A5-33	Identify water conservation measures.	This comment addresses the adequacy of the EIS. The FEIS was improved and modified by revising the analysis in Subchapter 4.4.1.3 to state that newly constructed buildings would have low flow water-saving devices.
A5-34	Identify the Northern Guam aquifer as a Sole Source Aquifer and provide a brief description of this program.	This comment addresses the adequacy of the EIS. The FEIS was improved and modified by adding text and a discussion related to the aquifer being a sole source aquifer to Subchapters 3.4.1, 3.6, and 4.4.1.5.
A5-35	Discuss what actions are being taken to remedy the raw sewage overflows into the storm runoff collection basin and into injection wells leading to the aquifer.	This comment addresses the adequacy of the EIS. The FEIS was improved and modified by adding text to Subchapter 3.4.2 stating that the Base is evaluating the present waste water system to include cleaning and video taping the lines. The text also shows that repairs and upgrades to the pumping stations have been completed which will preclude discharges to the UIC wells.

Transportation		
A5-36	In the Final EIS provide a road map showing the routes and street names references in the Transportation section. Include more information, if known, regarding the existing LOS for applicable sections of Route 9 and key roadway segments and intersections within or leading to the Base.	This comment addresses the adequacy of the EIS. The FEIS was improved and modified by adding the numbers of the Guam roads in the vicinity of the base to Figure 2.2-2. Additionally, analyses in Subchapter 4.4.1.6 were improved by adding that a construction and parking management plan would be developed that minimizes traffic interferences and maintains traffic flow. Subchapter 3.4.6 was improved to describe the baseline traffic count data and LOS for the intersection of Highway 1, Route 9, and Arc Light Drive (Main Gate) and the section of Route 9 where the Commercial Gate would be constructed. Accordingly, the analyses in Subchapters 4.4.1.6, 4.4.2.6, and 4.4.5 were revised to base the analyses on the projected traffic data and LOS.
A5-37	Estimate changes in LOS or impacts to Route 9 and indicate whether the current network is sufficient to meet future cumulative needs.	Please see response to comment A5-36.
A5-38	Adopt mitigation measures to eliminate congestion during project construction.	This comment addresses the adequacy of the EIS. The Air Force declined to include transportation-related mitigation in Subchapter 4.4.4 because the analyses in Subchapters 4.4.1.6 and 4.4.2.6 revealed no transportation impacts.
Schools		
A5-39	The scope of the EIS should include the analysis of impacts from all connected actions. In the Final EIS, identify all necessary school facility expansions, include those expansions in Tables 2.2-3 and 2.2-4 and Figures 2.2-3 and 2.2-4, and analyze the environmental impacts from these actions.	This comment addresses the adequacy of the EIS. The analysis in the FEIS was improved and modified by considering and further analyzing the issues noted in this comment by revising Subchapter 4.10.1.3 to show that the impact analysis for construction of the new high school to alleviate potential overcrowding could be used for elementary/middle school students.
Diesel Emission/Construction Emissions Mitigation		
A5-40	The Final EIS should disclose the available information about the health risks associated with diesel particulate matter and mobile source air toxics (see http://www.epa.gov/otaq/toxics.htm).	This comment addresses the adequacy of the EIS. The FEIS was improved and modified by adding text to the fourth paragraph of Subchapter 3.3 concerning health risks from diesel engines.

A5-41	EPA recommends including a Construction Emissions Mitigation Plan (CEMP) in the Final EIS.	This comment addresses the adequacy of the EIS. Although the Air Force accepts the CEMP in principle, some of the technology associated with the CEMP is not widespread and could put a burden on contractors, especially at remote locations such as Guam. Other elements of the CEMP (locating diesel engines, <i>etc.</i> , distance from residential areas and receptors) would occur naturally due to the distance between the sources and the receptors.
Federal Leadership in Sustainable Building		
A5-42	The Air Force should ensure the goals of EO 13123 (<i>Greening the Government through Efficient Energy Management</i>) and the Memorandum of Understanding (<i>Federal Leadership in High Performance and Sustainable Buildings</i>) are followed for all new construction.	This comment addresses the merits of the alternatives. The FEIS was improved by adding the guidance provided in this comment to Subchapter 2.2.1.1 and then using the information in the analysis in Subchapter 4.4.1.1.
A6-U.S. Department of the Interior		
A6-01	Overall, the Department is concerned the Draft EIS has not fully addressed all cumulative impacts to federally listed species and their habitat. Although the USAF has proposed various adaptive management techniques and conservation measures to help reduce project impacts, it is not clear that all potential direct and indirect impacts to listed species are offset.	This comment addresses the adequacy of the EIS. Subchapter 2.2.1.2 describes the conservation measures developed by the Air Force, which include an Adaptive Management strategy with various resource agency cooperators, to offset direct and indirect biological resources impacts that could result from the proposed action. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."
A6-02	The Department suggests the proposed Andersen Brown Treesnake Control Plan (Plan) and conservation measures address and incorporate the Department's concerns and recommendations for the final EIS.	This comment addresses the adequacy of the EIS. The FEIS has been improved and modified by incorporating USFWS concerns identified throughout the Section 7 consultation process into the conservation measures in Subchapter 2.2.1.2 and then improved the FEIS with the corresponding analyses. The Air Force declined to incorporate the commenter's concerns and recommendations into the Control Plan. However, concerns and recommendations will be considered in the next revision to 36 WG Instruction 32-7004, <i>Brown Tree Snake Management</i> , dated 15 March 2006. This instruction implements the <i>Brown Tree Snake Control Plan</i> prepared under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990.

Brown Tree Snake		
A6-03	Support for brown treesnake quarantine efforts by the U.S. Department of Agriculture – Wildlife Services (DOAWS) should be based on the staff levels required to maintain programmatic integrity during peak periods of cargo and vehicle movement off Guam.	Thank you for your comment.
A6-04	The Department strongly recommends a mechanism be cooperatively developed by the USAF, DOAWS and the Service that estimates the cost for DOAWS brown tree snake interdiction efforts at 100 percent level on Andersen, 18 months in advance. The Service recommends that the DEIS describe in detail funding mechanism and assurances for future interdisciplinary efforts.	This comment addresses the adequacy of the EIS. The Air Force will prepare a ROD which will address mitigation commitments. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
A6-05	Efforts should be made to identify and secure space for greater than a five-year period. To ensure that the orders to inspect cargo meet the DoD's Defense Transportation Regulation, we recommend that regulation protocols 505 and 506 be incorporated into the Plan and in [an] appendix to other Final EIS document.	This comment addresses the adequacy of the EIS. When the Air Force makes its decisions, the Air Force will prepare a ROD, which will address mitigation commitments. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force See response to A3-15 for protocols 505 and 506.
A6-06	The Department also recommends that DoD provide sustained base funding for applied brown tree snake research efforts by the DOAWS-National Wildlife Research Center (NWRC), as mitigation for proposed USAF expansion and cumulative effects of DoD expansion on Guam.	When the Air Force makes its decisions, the Air Force will prepare a ROD, which will address mitigation commitments. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
A6-07	The Department suggests the research scope and direction of NWRC efforts be determined by DoD, DOSWS Operations, NWRC, and Service staff through annual and multi-year goals with discrete, finite goals.	This comment addresses the adequacy of the EIS. The Air Force will continue to coordinate BTS interdiction with federal agencies in accordance with the Andersen AFB Brown Tree Snake Management plan.
Proposed Conservation Measures		
A6-08	...the Department recommends USAF consider offsetting any indirect loss of habitat, in addition to direct habitat loss, as part of proposed conservation measures in the Final EIS. These impacts could be offset by setting aside additional land for habitat enhancement through ungulate eradication, and brown tree snake control.	This comment addresses the adequacy of the EIS. Implementation of the conservation measures defined in Subchapter 2.2.1.2 would minimize direct and indirect loss of habitat from the ISR/Strike project. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."

A6-09	The Department suggests that new control techniques be developed for brown tree snake control at the bat colony (e.g., aerial broadcast of snake bait, and development of new bait types), and included in USAF's proposed conservation measures in the Final EIS, to help ensure benefits to the Mariana fruit bat population.	See response to comment A3-20.
A6-10	The Department recommends USAF include as part of their project, the ultimate goal of increasing juvenile bat survival and recruitment through brown tree snake control. Currently, the proposed project focuses only on the immediate goal of reducing snake numbers in the area and not the ultimate goal of promoting recruitment in the bat population.	See Response to Comment A6-09.
A6-11	...the Department recommends USAF also consider potential impact of bats abandoning the Pati Point colony site in the Final EIS, and develop appropriate measures, including offsite mitigation, to offset this impact if it occurs.	See response to comment A3-22.
A6-12	In addition to impacts to resident population of bats, the Department recommends USAF consider impact of flight operations on Mariana fruit bats that may have migrated to Guam from Rota temporarily due to typhoon and/or poaching events on Rota.	See response to comment A3-07.
A6-13	Recent survey work on Rota and Guam indicates the Pati Point colony can increase by approximately 100 individuals after a typhoon event on Rota.... ...these bats may not have habituated to aircraft disturbance. Adaptive management of flight operations may minimize these impacts, but USAF should be prepared to implement other appropriate measures to offset these impacts if modification of flight operations is not successful.	See response to comment A3-22.
A6-14	One of the goals of the 1994 cooperative agreement between USAF and the Department, through the Service, for the establishment and management of the Guam National Wildlife Refuge, is to develop a long-term, comprehensive program to conserve and recover federally endangered and threatened species. Please indicate in the Final EIS how your agency will utilize this agreement to further implement your natural resource conservation goals related to the proposed action.	See response to comment A3-03.

A6-15	GovGuam's DAWR is the primary agency working in the field on the recovery of federally threatened and endangered species under the Department's Section 6 Service grants. Please indicate in the Final EIS how proposed USAF conservation measures would be integrated with existing and future activities of DAWR and actions by other natural resource management and research entities.	The comment addresses the adequacy of the EIS. Subchapter 4.5.1.3 states that the project goals of the INRMP would be supported by the conservation measures in Subchapter 2.2.1.2. The Air Force coordinates with federal and local agencies in accordance with the INRMP. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
A6-16	The Department suggest that professional outside expertise be utilized to write and implement a plan [for ungulate eradication]. Please consider proposing for the Final EIS some of the newer ungulate controls for conservation measures such as the "Super Sow."	See response to comment A3-09.
A6-17	Please include in the Final EIS, "the goal of the HMU is to create a 165-acre snake exclosure using a typhoon-proof snake barrier." [language taken from draft EIS]	This comment addresses the adequacy of the EIS. The Air Force improved and modified the FEIS as suggested the commenter by adding the details of the comment to Subchapter 2.4.2.2.
Cumulative Impacts on federally listed endangered species		
A6-18	Estimates in the Draft EIS for cumulative loss of habitat do not take into full account all direct and indirect project-related impacts. Only vegetation cleared for first phase of the project is discussed in the Draft EIS. ...the Department recommends areas proposed for clearing during second phase of the MSA Igloo project and areas subject to disturbance associated with training in the NWF and ISR/Strike (e.g., forest adjacent to the proposed aircraft staging area under proposed ISR/Strike) be assessed in the cumulative impacts of the Final EIS, and appropriately mitigated.	See response to A3-17.
A6-19	The Department recommends that any potential increases in munitions capacity at Andersen, due to the proposed ISR/Strike and resulting impacts on federally listed species, be addressed in the Final EIS.	See response to comment A3-17.
Specific Comments		
A6-20	Page 1-3. The Department recommends USAF also evaluate all potential actions by Federal agencies in the Final EIS.	See response to A3-04.

A6-21	Page 2-41, Table 2.4-1. The Department recommends additional information about location of proposed Combat Arms Training and Maintenance Facility be included in the Final EIS. If this facility is expected to have impacts on biological resources (e.g., vegetation clearing and weapons training noise), we recommend it be addressed in the Final EIS.	See response to A3-31.
A6-22	Page 2-58, Section 2.4.3. The Department recommends additional information about Transportable Airlift Control Element Unit and Logistics Unit should be included in the Final EIS.	See response to A3-32.
A6-23	Page 3-50, Line 24-25. The statement that the population in the Commonwealth of the Northern Mariana Islands was listed as threatened when the Guam population was listed as endangered is incorrect. Please correct for the Final EIS.	See response to comment A3-42.
A6-24	Page 3-52, Line 38-39. The Guam Micronesian kingfisher was recorded along the survey transect (transect nine) next to proposed aircraft staging area in 1981; therefore, kingfishers likely utilized vegetation proposed for clearing in the project area. If USAF is defining this area as Andersen Main, then the statement about kingfishers not being present in 1981 is incorrect. Please correct for the Final EIS.	See response to comment A3-44.
A6-25	Page 4-59, Table 4.5-4. Estimated Mariana crow suitable habitat that would be cleared is presented as approximately half the amount of suitable Mariana fruit bat habitat, even though they both include the same vegetation types. The Department estimates suitable Mariana crow habitat should be equal to the current estimate of suitable Mariana fruit bat habitat in the Final EIS.	See response to comment A3-45.
A6-26	Page 4-61, Lines 25-29. Assessment of project impacts on Mariana fruit bat habitat does not include that of indirect habitat loss due to human disturbance activities. Forested areas adjacent to proposed aircraft staging area would be exposed to human activity that may limit potential of these forests to support long-term conservation of the Mariana fruit bat. The Department recommends these indirect impacts and associated acreage should also be included in the assessment on potential habitat loss for this species.	See response to comment A3-46.

A6-27	Page 4-62, Lines 22-34. The biological resources section of Table 4.13-1 (page 4-113) states that much of acoustics associated with aircraft noise is below 2 kiloHertz, implying it may not affect Mariana fruit bats. There is no evidence to support this assumption and it should be removed in the Final EIS.	This comment addresses the adequacy of the EIS. The Air Force improved and modified the summary in Table 4.13-1 to agree with the analysis in Subchapter 4.5.1.3.
A6-28	Page 4-65, Lines 22-34. Assessment of project impacts on Mariana fruit bat habitat does not include that of indirect habitat loss due to human disturbance activities. Forested areas adjacent to proposed aircraft staging area would be exposed to human activity that may limit potential of these forests to support long-term conservation of the Mariana crow. These indirect impacts and associated acreage should also be included in the assessment on potential habitat loss for this species.	See Response to comment A3-46.
A6-29	Page 4-67, Lines 30-34. Assessment of project impacts on the Guam Micronesian kingfisher does not include an assessment of loss of habitat needed to support recovery of the species on Guam. The Draft EIS only states that habitat within the MSA, a proposed reintroduction site, would not be impacted by the proposed project. USAF should consider effects of direct and indirect habitat loss on long-term conservation of the Guam Micronesian kingfisher for the Final EIS.	See response to comment A3-48.
A7-GovGuam-Dept of Bureau of Statistics and Plans		
Flight Operations and Increased Decibel Levels		
A7-01	Is the AICUZ zone being widened in light of the additional runways that are being considered?	This comment addresses the adequacy of the EIS. The analysis in the FEIS was improved and modified by adding CZs and APZs I the text in Subchapter 4.2.1.
A7-02	Please include the current flight path, indicate the old AICUZ zone if any.	See response to A7-01.
A7-03	It would be helpful if the flight increases occur at appropriate times of the day in consideration to the nearby community.	The rationale for not accomplishing operations during the “appropriate” times of the day was added to the Aircraft Operations section of Subchapter 2.2.1.
A7-04	The average busy day airfield operations would increase from approximately from 235 operations to 381 operations. The number of flights may potentially affect the Endangered Species population as well and needs to be addressed accordingly.	This comment addresses the adequacy of the EIS. Subchapter 4.5.1.3 of the DEIS and FEIS discuss the effects of noise from aircraft operations on endangered species. Additionally, the potential for a bird-aircraft strike is discussed in Subchapter 4.11.1.3.

Land Cover and Impervious Surfaces		
A7-05	Northwest Field sits above the sole source aquifer system and must incorporate all anti-spill and counter-containment measures. In addition, it would be necessary to work with the Guam Environmental Protection Agency for its Soil Erosion and Sedimentation Control Measures, and obtain any other required permits.	See responses to A4-6 and 7 and A5-02, 27, 34, and 35.
Endangered Species Habitat		
A7-06	It would be critical to work with the Department of Aquatic and Wildlife Resources office regarding the Endangered Species Act.	See response to A6-15.
Stored Fuel		
A7-07	The expected increase in stored fuel and other hazardous materials is a major impact and would primary and secondary containment devices. What are the existing procedures for delivery, transport, and removal of these fuels?	This comment addresses the merits of the alternatives. Text in Subchapter 3.8.4 was improved and modified by considering the matters noted in this comment. Additionally, the analysis in Subchapter 4.8.1.2 was improved and modified by quantifying the amount of hazardous waste.
A7-08	A list of all chemicals, fuels and hazardous materials the Military plans to bring in should be added to the Environmental Impact Assessment [sic] for our review.	This comment addresses the merits of the alternatives. Subchapter 4.8.1.1 of the DEIS recognizes that it is not likely any new hazardous materials would be needed as a result of the proposed action.
Personnel		
A7-09	Routes 1, 15 and 3 now experience heavy traffic and should be a consideration in the Environmental Impact Assessment.	This comment addresses the adequacy of the EIS. Subchapter 3.4.6 was improved by considering and further analyzing the issues in this comment by using data from an August 2006 draft report of a traffic study that quantified peak time traffic volumes at the intersection of Arc Light Boulevard and Routes 1 and 9 and along Route 9 where the Commercial Gate would be constructed. These recent data were used to revise the analysis in Subchapters 4.4.1.6, 4.4.2.6, and 4.4.5.
A7-10	The number of housing units will also be an impact if all proposed facilities and dwelling units are not completed prior to any expected personnel relocation is to take place.	This comment addresses the adequacy of the EIS. Subchapters 2.2.1.1 and 4.10.1.2 were improved and modified based on the issues in this comment to state that the proposed additional housing projects (family housing renovation and construction and dormitory construction) would occur on a phased schedule that mirrors the phased increase in the number of personnel.

Landfill Relocation		
A7-11	The DoD should work with the Government of Guam officials in order to properly handle the amount of landfill wastes expected to be generated by the base operations.	This comment addresses the adequacy of the EIS. The text in Subchapter 4.1.1.5 was improved by indicating that Andersen AFB would submit the permit application for Guam EPA coordination to ensure the landfill expansion project is not delayed.
A7-12	The hazardous wastes generated during and after construction should be sent off-island for proper disposal so as to minimize any impacts.	This comment addresses the adequacy of the EIS. The analysis in the FEIS was improved and modified by considering and further analyzing the issues in this comment by expanding the next to last paragraph of Subchapter 4.8.1.2 to show that hazardous waste could be sent off-island if it could not be accommodated on-island.
Other		
A7-13	The use of nonpoint source Best Management Measures will have to be taken into account for all phases of development and the timeline of construction should be taken into account during the rainy season.	This comment addresses the adequacy of the EIS. Subchapters 1.2.5, 4.4.1.4, 4.5.1, and 4.6.1 of the DEIS (and FEIS) contain a variety of best management measures associated with overall construction.

O1-Earthjustice

O1-01	<p>The DEIS fails to satisfy NEPA's mandate to take a hard look at the environmental consequences of the Air Force's proposed course of action. Initially, it contains no analysis whatsoever of potential impacts associated with "training range and airspace utilization" by the scores of fighters and bombers the Air Force proposes to deploy to Andersen, despite the Air Force's concession that they "may ultimately be relevant to significant adverse environmental impacts."</p>	<p>The Air Force recognizes its responsibility to analyze the impacts of future impacts associated with its decision making relative to training range utilization. The Air Force is deferring its decisions on potential range utilization issues to a future decision point when those matters will be "ripe" for decision. Those future training decisions will be based on a Navy EIS (of which the Air Force is a cooperating agency) that will fully evaluate military training operations in the Mariana Islands.</p> <p>The Navy will be revising the Range Complex Master Plan for all ranges within the Mariana Islands under the Tactical Training Theater Assessment and Planning Program Associated with the Master Plan revision. The Navy will prepare a Mariana Islands Range Complex EIS, which is anticipated to be completed in July 2009, which coincides with Phase 0 of the ISR/Strike operational capability. That EIS will assist in defining how the Air Force's ISR Strike aircraft will train after rotations from home units begin.</p> <p>It is worth reiterating that ISR Strike aircraft personnel will receive the majority of their required training before departing their home station. Although there will be some training associated with the ISR Strike aircraft, training is a secondary issue to the operational prerogatives established in various Department of Defense and Air Force strategic plans for ISR Strike basing on Guam.</p> <p>The Air Force has clarified its intent with respect to range utilization in its discussion of Aircrew Training in Section 1.2.2 and other related sections of the FEIS.</p>
O1-02	<p>That the Air Force may not yet have determined the specifics of its training does not relieve it of its obligation under NEPA to analyze these "reasonably foreseeable" impacts. (40 CFR §1502.22)</p>	<p>See response to O1-01. The Air Force intends to fully comply with its obligations under NEPA as they relate to ISR/Strike future training as a Cooperating Agency on the Navy's upcoming Mariana Islands Range Complex EIS.</p>

O1-03	The DEIS fails to address the potential for establishment of the ISR/Strike capability at Andersen to make Guam a more attractive target for terrorism, a matter of grave concern to Guam residents.	This comment addresses the merit of the alternatives and the adequacy of the EIS. The change of or increase in operations at a large, already highly armed and defended military installation does not translate into making either the military or civilian population, on or off-base, a more attractive target for terrorism. The additional personnel and operational capabilities at this military installation also would increase the ability to deter, detect, and defend against terrorism. Should the Air Force determine a threat of terrorism may increase for any reason, appropriate steps would be taken with regard to defense and security. Additionally, neither the proposed action nor any of the alternatives would introduce materials that could be used by terrorists or others to cause mass casualties in the community, such as nuclear, chemical or biological warfare material. Neither the proposed action nor any of the alternatives change the way in which existing weapons or materials are stored or handled.
O1-04	The DEIS does not analyze the “departure of personnel and aircraft from the installations that would be the source for the personnel and aircraft that would be part of the ISR/Strike capability.” ...the DEIS states merely that analysis of the impacts would be carried out by the “losing organization(s).” This is a classic case of segmentation....	This comment addresses the merit of the alternatives and the adequacy of the EIS. Analysis of the locations from which the ISR/Strike aircraft would be sourced (e.g., where the aircraft originate) is not within the scope of this EIS and has no relationship to the choice of ISR/Strike basing alternatives or the impacts associated with the proposed action and alternatives. The aircraft and personnel required for the proposed ISR/Strike at Andersen AFB would, for the most part, rotate from various bases in the continental U.S. on a temporary basis, and the specific “source” bases may change from time to time. Aircraft that would make up the ISR/Strike capability were individually based at their home stations under separate NEPA analyses and decision-making processes.
O1-05	Discussion of the “no action” alternative.....fails to assess continued operation of the units at their current installations.	See response to O1-04. The No Action Alternative does not require the analysis of “continued operations” at the home stations of ISR/Strike aircraft. Should the ISR/Strike proposal not move forward, the aircraft that are a part of the ISR/Strike capability would continue to operate under previously completed NEPA analyses and related Air Force decisions.
O1-06	Failure to analyze the environmental impacts associated with various actions the Department of Defense intends to carry out on Guam in the near future violates NEPA’s mandate to discuss cumulative impacts....	See A3-04 and A3-27. Cumulative impacts for future actions can only be addressed when other possible future proposals are defined to the extent that the issues are formed enough to be reasonably foreseeable and contain enough specificity to be identified and potential impacts analyzed. When those future actions are not within the purview of the Air Force to define, the Air Force is not required to postpone the analysis and later implementation of its own proposed actions until after the proponent of possible future actions provides enough information to make meaningful analysis of the future actions possible.

O1-07	The Air Force must disclose in the DEIS the underlying environmental data that support its conclusion that destroying over 122 hectares of essential recovery habitat (nearly 2.7 percent of the refuge land) “would not be expected to jeopardize recovery and continued existence of listed species.”	See response to comment A3-03.
O1-08	The Air Force must explain the basis for its conclusion that Andersen’s brown tree snake inspection program would ensure “no potential adverse effects to offsite [threatened and endangered] species, due to both the ISR/Strike capability project viewed in isolation and cumulatively.	The comment addresses the adequacy of the EIS. As identified in the 36 WG Instruction 32-7004, <i>Brown Tree Snake Management</i> (which is the basis for a conservation measure in Subchapter 2.2.1.2 and is considered in the analysis in Subchapter 4.5), 100% of aircraft, material, and cargo that depart Andersen AFB would be inspected. Additionally, the USFWS Biological Opinion, which was issued after the DEIS was made available for comment, states that “...the potential adverse impacts of the proposed action on listed species found outside Guam (e.g., Oahu elepaio) are insignificant or discountable.”
O1-09	The DEIS must respond to expert biologists’ concerns about the proposal to build new housing within the forested area between the golf course and the cliffline on the eastern portion of Andersen.	See response to comment A3-02.
O1-10	In discussing the “no action” alternative, the DEIS inaccurately assumes the Air Force would not undertake any conservation measures unless it also moves forward with habitat destroying activities in pursuit of the ISR/Strike capability at Andersen. Since the various conservation measures described in the DEIS are clearly feasible, the Air Force is legally obliged to implement them, regardless of its ultimate decision on the ISR/Strike project. By asserting that none of these beneficial conservation measures would be implemented without the ISR/Strike project, the DEIS improperly presents a distorted view of impacts to endangered species and other biological resources.	This comment addresses the adequacy of the EIS. The conservation measures associated with the proposed action are not included in the Base’s INRMP, which is the basis for biological resources management at Andersen AFB. The DEIS points out that the INRMP is the basis for current biological resources management. The potential impact of establishing and operating the ISR/Strike capability (to include the conservation measures in Subchapter 2.2.1.2) is compared with the No Action Alternative. Additionally, the October 3, 2006 USFWS Biological Opinion states that “...the Service’s finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force.”
O1-11	Since the Memorandum of Agreement with the Guam Historic Preservation Office does not yet exist, the Air Force lacks any basis for concluding there would be no likelihood of significant impacts, whether the ISR/Strike project is viewed in isolation or cumulatively.	This comment addresses the adequacy of the EIS. The analysis in the FEIS was improved and modified by updating Subchapters 1.2.5 and 4.9.1 to reflect the completion of a cultural resources survey as well as the concurrence from the GSHPO that no further archaeological work will be necessary, thereby completing Section 106 consultation.

O1-12	Because it is feasible for the Air Force to conduct cultural resource inventories and evaluations within the planned impact areas, the Air Force must carry out these surveys and include analysis of their results in the DEIS, before making any decision whether to proceed with the ISR/Strike capability project.	See responses to comment O1-11.
O1-13	The DEIS's analysis of socioeconomic impacts is completely one-sided, emphasizing only benefits, while ignoring the adverse effects on Guam's island economy of the proposed influx of federal construction dollars and workers.	This comment addresses the adequacy of the EIS. The socioeconomic impact analysis in Subchapter 4.10 was accomplished using the Economic Impact Forecast System program that was developed and is maintained by the USACE to consider the effects of a project such as the ISR/Strike on the economy.
O1-14	There is no discussion of the inevitable increase in housing prices for Guam residents when thousands of personnel associated with the ISR/Strike project arrive on-island, siphoning off the supply of available housing.	This comment addresses the adequacy of the EIS. The Air Force action is not the only influence on Guam's housing prices. Other factors include actions such as housing for persons associated with the island's tourism industry, which fluctuates. Subchapter 4.10 of the EIS explains how vacant and partially vacant hotels damaged by typhoons could be repaired and occupied.
O1-15	The DEIS does not consider how the "increased demand for local and regional services, materials, and supplies" would generally inflate prices and, in some cases, cause disruptive shortages, both of which would harm Guam's businesses and residents.	See response to O1-13.
O1-16	To satisfy NEPA, the Air Force [is] obliged to analyze fully in the DEIS the environmental impacts of pursuing not only its preferred alternative, but also a reasonable range of alternatives.	This comment addresses the merits of the alternatives. The Air Force further clarified its rationale in Subchapters 1.1 and 2.1, among other places in the FEIS, by identifying Andersen AFB to support ISR/Strike. Andersen AFB was identified as the installation best-suited to host the ISR/Strike capability in a process driven by the 2001 QDR and a consideration of six installations in Pacific Air Forces' area of responsibility. An additional process considered whether the status of the aircraft and personnel associated with the ISR/Strike capability should be permanently based or rotated, or a combination of the two options. The Air Force's decision to consider the above – two Action Alternatives and the No Action Alternative – is in accordance with NEPA, the CEQ NEPA Regulations, and the Air Force's EIAP.

O1-17	<p>In discussing why the Air Force eliminated from detailed discussion all location alternatives other than Andersen, the DEIS fails to justify its assumption that, to accomplish the stated goal of “maintaining regionally tailored forces, forward stationed and deployed in the Asian theater,” all of the ISR/Strike aircraft and related activities must be stationed at the same installation.</p> <p>Notably, locating all assets at the same facility is not one of the standards for selection of a “viable location for the ISR/Strike capability for the Pacific Region” set forth in the DEIS.</p> <p>The Air Force must expand the DEIS’s analysis to consider a reasonable range of alternatives involving stationing at more than one facility, or, in the alternative, must explain why stationing at more than one facility is not feasible.</p>	<p>See response to O1-16. The Air Force clarified in Subchapter 2.1.3.1 the rationale for its proposed basing of the ISR/Strike capability on Guam and why ISR/Strike assets would be based at the same facility. Splitting the ISR/Strike assets (<i>i.e.</i>, the tankers, fighters, bombers, Global Hawks across two or more beddown locations would increase the footprint of the support facilities. Andersen AFB has pre-positioned support facilities prepared to service rotational bombers, fighters, and tankers. By placing some assets on Andersen AFB and other assets at another location, the combined footprint of areas required to support the ISR/Strike mission would be exponentially increased. Increasing the footprint, in turn, increases the summed environmental impacts across all locations utilized. For example, construction of duplicate facilities (<i>e.g.</i>, security protection, aircraft maintenance, <i>etc.</i>) would be required because facilities at a single location are shared by more than one element of the ISR/Strike capability, thereby increasing the overall cost. Also, the element of surprise would be reduced if ISR/Strike aircraft are launched from two locations. The Air Force framed its subsequent alternatives in support of the ISR/Strike basing on the underlying purpose and need (among other reasons) as dictated in the 2001 QDR and related strategic rationale.</p>
O2-Conservation Council for Hawaii		
O2-01	The DEA [sic] is inadequate in describing the required mitigation measures involving brown tree snake control and interdiction.	See response to comment O1-08.
O2-02	The Air Force plays down the significant and likely event that the brown tree snake will continue to be transported to other areas, including Hawaii, other Pacific Islands with high numbers of rare and endangered species, and the U.S. mainland.	See Response to Comment 01-08
O2-03	Where is the “Air Force BTS inspection protocol” written down?	This comment addresses the adequacy of the EIS. Appendix C of the BA, originally Appendix D of the DEIS and now Appendix E of the FEIS, is 36 Wing Instruction 32-7004, which contains the inspection procedures for aerial port cargo, outbound aircraft, munitions shipments, TMO shipments, and HSC-25 aircraft.
O2-04	Was the protocol developed and approved by expert wildlife agencies?	This comment addresses the merits of the analysis. 36 Wing Instruction 32-7004 was developed by representatives from the DoD, DOI, Department of Agriculture, Department of Transportation, State of Hawaii, GovGuam, and CNMI.
O2-05		When the Air Force makes its decisions, the Air Force will prepare a ROD, which will address mitigation commitments. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force

O2-06	How does the protocol interface with the instruction included in the back of the DEIS, other brown tree snake protocols referred to [in] the DEIS, the brown tree snake control plan, and any other documents related to brown tree snake control and interdiction?	This comment addresses the adequacy of the EIS. The Air Force improved and modified the FEIS by inserting the correct citation in Subchapter 2.2.1.2. The correction resolves a conflict that existed between the title of the OI in the BA appendix and the EIS.
O2-07	The DEIS refers to documents related to brown tree snake interdiction, but these documents are not included as appendices to the DEIS.	This comment addresses the merits of the analysis. The DEIS text contains relevant information from various sources, which are cited in the text and listed in the References section. This comment is impossible to respond to more precisely without more specificity in the comment.
O2-08	We urge the Air Force to work with the U.S. Fish and Wildlife Service, U.S. Department of Agriculture, and other relevant agencies, and prepare a comprehensive document for brown tree snake interdiction, including the role of all agencies involved; laws, instructions, orders, procedures, and protocols relevant to brown tree snake control and interdiction; necessary funding, staff, and infrastructure; funding sources, and timetables; and any other information that will clarify how the Department of Defense intends to keep the potential for off-base transport of brown tree snakes low.	This comment addresses the adequacy of the EIS. When the Air Force makes its decisions, a Record of Decision, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
O2-09	The DEIS does not describe the cumulative impact of the proposed action, taking into account past, ongoing, and future military actions on Guam, including actions by other branches of the military (e.g., stationing of Marines from other U.S. bases in the Pacific).	See response to comment A3-04, A3-27, and 01-06, <i>et seq.</i>
O3-Audubon Society		
O3-01	The final EIS should not be completed until the synergistic impacts of all military related actions can be considered with respect to alteration of habitat that would affect recovery and perpetuation of significant species on Guam.	See response to comment A3-04, A3-27, and 01-06, <i>et seq.</i>
O3-02	Since habitat loss may be the number one reason for the decline and extinction of species, the final EIS should address exactly how much land is necessary for the support of the threatened and endangered species on Guam.	This comment addresses the adequacy of the EIS. As identified in Subchapter 2.2.1.2, conservation measures were developed to correspond to the USFWS Recovery Actions for the species. Additionally, under NEPA, the Air Force is obligated to assess only the potential direct and indirect impacts from the proposed action and not a broader study as suggested by the comment. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."

O3-03	According to the Draft EIS, under Alternative A and other actions, a total of 122.7 hectares of limestone forests would be subject to removal or alteration. Since this is undeveloped land, it may, in the future, continue to be considered for inclusion in other actions requiring development. Conservation mitigation measures that set aside protected land in other locations cannot compensate for fractionation of property.	This comment addresses the merits of the alternatives. As stated in the conservation measure in Subchapter 2.2.1.2, the Andersen AFB General Plan would be modified to include a special conservation designation for the enclosure areas, which were developed to be contiguous to avoid fractionalization of habitat. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force." Also see response to A3-03.
O3-04	The final EIS should include a detailed plan of action for monitoring the behavior of the bat and crow to determine their reaction to the changes in their habitat. The plan should identify sources of funding and staffing as well as possible mitigation measures in the event that the populations do decline as a result of the noise.	This comment addresses the merits of the alternatives and adequacy of the EIS. The adaptive management and noise conservation measures in Subchapter 2.2.1.2 of the EIS were developed to monitor behavior. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force." When the Air Force makes its decisions, a ROD, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
O3-05	Conservation measures identified as mitigation for habitat loss should be described in detail in the final EIS. The detail should include sources of funding as well as a proposed timeline for implementation of the projects. The plan should also include a means of accountability or monitoring.	This comment addresses the merits of the alternatives and adequacy of the EIS. Implementation of the conservation measures identified in Subchapter 2.2.1.2 and assessed in Subchapter 4.5.1 minimize the need for mitigation. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force." When the Air Force makes its decisions, a ROD, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
O3-06	Mitigation measures should include a plan for the recovery of the endangered plant <i>Serianthes nelsonii</i> . This tree is found on the Air Force property although, not within the proposed ISR/Strike impacted areas. Because it is an endangered species, assistance in its recovery as mitigation for degradation of natural vegetated lands is appropriate.	This comment addresses the merits of the alternatives. As the comment states, the tree is not found in the ISR/Strike project area and would not be affected by the project. Additionally, the ungulate enclosure conservation measure identified in Subchapter 2.2.1.2 would encompass two of the six known specimens. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
O3-07	The final EIS should ... include a plan to coordinate with the Government of Guam Aquatic and Wildlife Resources Division to assist with and augment their existing captive breeding and recovery efforts for the Guam rail and Micronesian kingfisher. The plan should address plans for the eventual release of these species into appropriate habitat on AAFB.	See response to comment A3-03.

O3-08	The final EIS should include a plan for identification of organisms of concern as foreign invaders and for their containment and possible elimination. Efforts should be coordinated with existing programs via both local Government of Guam programs and those established in agencies of the federal government.	This comment addresses the adequacy of the EIS. Elements of execution of the INRMP as described in Subchapter 3.5.4 of the EIS include identification of organisms of concern.
O3-09	Because recreational hunting will no longer be allowed it is recommended that an ungulate eradication program (rather than depredation hunting) be devised and implemented.	See response to comment A3-09.
O3-10	The plan [ungulate eradication program] should include specific provisions for control of non-native plant species.	See response to comment O3-08.
O3-11	Outplanting of foraging trees important to Marianas fruit bat and Marianas crow has not been attempted before. Since there is no guarantee it would actually work and it would take many years to become effective, this plan should be considered as an additional mitigation measure that does not contribute to the conclusion that the habitat for these species will actually be enhanced rather than an immediate mitigation measure.	This comment addresses the merits of the alternatives. The conservation measure in Subchapter 2.2.1.2 was developed based on a suggestion by USFWS to reduce foraging stress. The conservation measure in Subchapter 2.2.1.2 was improved by stating the value of foraging plots. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
O4-Guam Legislature-Senator Joanne M.S. Brown		
04	Oral comment provided during June 1, 2006 public hearing. In favor of the project and appreciation for reuse of developed land on Andersen AFB for the project to the maximum extent possible.	This comment addresses the merits of the alternatives. Air Force planning for establishment of the ISR/Strike capability did consider use of previously disturbed land or use of land to minimize the potential for impacts. For example, the site for the proposed ASA was revised to reduce the amount of forest that would be cleared as a result of biological resources surveying (see Subchapter 2.2.1.2 of DEIS and FEIS).
O5-Guam Legislature-Mr. Adolpho Palacios		
O5	Written comment provided at June 1, 2006 public hearing. In favor of the project.	Noted.
P1-Virginia Polytechnic Institute		
P1-01	It does not appear that the proposed project will have any direct, adverse effects on plans for bird restoration.	The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."
P1-02	There may be indirect effects on bird restoration efforts due to having more people and more activity on Guam.	This comment addresses the merits of the analysis. The conservation measures stated in Subchapter 2.2.1.2 of the FEIS were tailored to correspond to the USFWS recovery plans for the various bird species and the recovery plans consider human disturbance such as poaching. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."

P1-03	It appears that the Air Force has planned its activities in a way that minimizes impacts on bird restoration efforts.	This comment addresses the merits of the analysis. As discussed in Subchapter 4.5 of the DEIS and FEIS, conservation measures such as BTS trapping (by bait stations or other methods) and exclosures are intended to promote restoration and recovery. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
P1-04	The major conservation action needed for bird restoration is construction of a brown tree snake barrier around the MSA.	This comment addresses the merits of the alternatives. The MSA is outside the ISR/Strike project area.
P2-University of Guam		
P2-01	The Draft EIS should report a yearly average from at least the last year, or perhaps two years. In addition, not all bats present on AAFB are located at the Pati Point colony, the Draft EIS should acknowledge the existence of a non-colonial population of flying foxes, and that the current population in the northern forests is estimated at approximately 100 animals.	This comment addresses the adequacy of the EIS. The FEIS was improved as suggested by the commenter by adding information from the comment to Subchapter 2.2.1.2. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
P2-02	The causes for flying fox declines reported in the Draft EIS are restricted to predation by BTS and incidental poaching, yet there are several references in the Draft EIS to forest degradation caused by feral ungulates. My own research indicates that feral ungulate impacts are reducing the density and diversity of flying fox forage tree species. Perez (1973) and Wheeler (1979) also attribute habitat destruction for military and civilian development as an important cause of flying fox declines island-wide. This aspect should also be included in the Draft EIS, particularly in light of the fact that the proposed action calls for destruction of currently occupied flying fox habitat.	This comment addresses the adequacy of the EIS. The Wildlife Management Specialist, Ungulate Exclosure Fencing, and Ungulate Planning and Research conservation measures stated in Subchapter 2.2.1.2 of the FEIS contain elements to control ungulates. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
P2-03	It is evident that Guamia and Aglaia-Guamia forest types are capable of supporting flying foxes and should be considered equally important to other forest types. The Draft EIS should be altered to reflect the quantity of Guamia and Aglaia-Guamia forest to be cleared as having a direct impact on flying foxes.	This comment addresses the merits of the analysis. As discussed in Subchapter 4.5 of the DEIS and FEIS, these forest types are not excluded in the analysis of suitable habitat loss for Mariana fruit bats. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."

P2-04	The Biological Resources summary (Table ES-1) states that “no adverse modifications to species habitat associated with this proposed action would occur.” ... The Draft EIS should be amended to acknowledge the adverse impacts associated with clearing even small amounts of degraded forest.	This comment addresses the merits of the analysis. As discussed in Subchapter 4.5 of the DEIS and FEIS, the phrase “No Adverse Modification” is in reference to definitions of habitat effects defined in the Section 7 Consultation Handbook and is applied in the appropriate context. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project “...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA.”
P2-05	I would like to see a second full time position added with, or under the supervision of, the Wildlife Management Specialist with an “in the field” focus of responsibility. Working together these two positions will be better able to plan, execute, monitor and adapt wildlife mitigation and management projects.	See response to comment A3-08.
P2-06	Ungulate management, of the style proposed in the Draft EIS, should be implemented base-wide in all forested areas of the Overlay Refuge. ... If base-wide ungulate management is being considered by AAFB in the upcoming INRMP review, the Draft EIS should acknowledge that fact.	This comment addresses the merits of the alternatives. The alternatives apply only to the areas of the Base that could be affected by the project and how the current management guidance such as the INRMP could be affected.
P2-07	The location of the proposed exclosures requires additional thought. From reading the Draft EIS, this location appears to have been selected for its Priority 1 Mariana crow habitat designation, and the ease of fencing using cliffs as a barrier. It does not appear that the needs of flying foxes were addressed in selecting this location. ... I suggest looking at areas in the Pati Point Conservation Area, Tarague Basin, and between the ASA project area and the Tarague cliff line.	This comment addresses the merits of the alternatives. The activities associated with the conservation measures (e.g., ungulate management) in Subchapter 2.2.1.2 were developed to minimize disturbance of the Pati Point colony to avoid colony abandonment. The October 3, 2006 USFWS Biological Opinion states that “...the Service’s finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force.”
P2-08	...the Draft EIS proposes to outplant flying fox forage tree species in 50 x 50 m plots. The current location proposed for these tree plots is in open, herbaceous cover areas. It is my opinion that given the small size of these plots in open, unforested areas makes them especially prone to typhoon damage during every stage of their life, limiting their potential usefulness. These open herbaceous areas would be better managed as a whole using a diverse mix of native forest species to reestablish a typhoon-resistant forest.	This comment addresses the merits of the analysis. This conservation measure mentioned in Subchapter 2.2.1.2 was suggested by USFWS to reduce foraging stress species may experience after a typhoon event. Placement of plots, however, is not finalized, and the Air Force would consider modifications of the final outplanting design to increase survivability during a typhoon event. The October 3, 2006 USFWS Biological Opinion states that “...the Service’s finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force.”

P2-09	Forest management projects proposed as mitigation for the ISR/Strike proposal will take far longer to achieve a successful offset of impact than the 10-years of phased development by AAFB. ... Safeguards must be placed on any mitigation AAFB commits to, to guarantee AAFB support and funding for at least as long as the land is occupied by the U.S. Government.	This comment addresses the merits of the alternative. As discussed in Subchapter 4.5 of the FEIS, the intention of the Air Force is that the conservation measures will continue after the ISR/Strike is established. Additionally, implementation of the project has been revised to a 16-year period. When the Air Force makes its decisions, a ROD, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
P2-10	I am also concerned about the increase level of noise associated with the increase in aircraft activities at AAFB as part of the ISR/Strike proposal. ... I am also concerned about the 13% of flight operations expected to occur at night. It is not clear how much of an increase this represents over current operations. ...	This comment addresses the adequacy of the EIS. As discussed in Subchapter 3.1.2, approximately 5% of the baseline operations occur at nighttime (10:00 p.m. through 7:00 a.m.). Subchapter 4.1.1.1 notes that the number of nighttime operations for Alternative A would remain at 5% of total operations, or no change from the baseline. The rationale for not accomplishing operations during nighttime was added to the Aircraft Operations section of Subchapter 2.2.1.
P2-11	[Studies of noise effects on flying foxes] should not only observe acute reactions by the flying foxes to aircraft noise, but also cumulative effects of noise increases that may cause movements away from the Pati Point colony or emigration to Rota.	See response to A3-07.
P2-12	To adequately monitor flying fox behavior, I suggest that AAFB fund a telemetry study to be conducted from project initiation until 18 months after completion for the final phase of development.	This comment addresses the merits of the alternatives and adequacy of the EIS. When the Air Force makes its decisions, a ROD, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force."
P2-13	BTS control at the Pati Point colony has been proposed as a mitigation objective. ... Attempting to control BTS at the Pati Point colony will be expensive, and at this point, unnecessarily risks disturbing the colony. ... I recommend that plans to control BTS at the Pati Point colony be postponed pending further observation of the Pati Point colony.	See response to A3-20.
P3-Dr. Justin B. deCruz		
P3-01	The lack of the estimate of the impact an additional 8,000 or more people will have on sectors such as housing, the economy, transportation, and biological resources, leaves the Draft EIS fatally flawed.	See response to A3-04.

P3-02	I suggest that in the Final EIS the reasoning behind the selection of Alternative A as the preferred choice be detailed.	This comment addresses the merits of the alternatives. The impacts differences between the two ISR/Strike alternatives is not substantial. Thus, implementation of Alternative A is preferred because it also provides better operational capabilities.
P3-03	I suggest that the Final EIS incorporate some plan to utilize at least a portion of the nearly 4,700 unemployed (page 3-77) on Guam, thus alleviating some of the pressure on local land resources and social infrastructure.	This comment addresses the merits of the alternative. The effect on overall employment of the high level of construction during the early 1990s was that every “able and willing to work” person on Guam was able to be fully and gainfully employed. During that time, no programs were required to achieve this effect; it came about as a result of the action of supply and demand market forces.
P3-04	I suggest that the Final EIS more clearly state that the proposed actions would negatively impact biological resources.	This comment addresses the merits of the alternative. Implementation of the conservation measures in Subchapter 2.2.1.2 would minimize the potential for biological resources impacts. The October 3, 2006 USFWS Biological Opinion states that “...the Service’s finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force.”
P3-05	Because BTS interdiction is critical to the environmental security of many areas of the U.S., I urge the Department of Defense to include as part of the proposed action a conservation measures that funds a Wildlife Services expansion (e.g., hiring of personnel, training, and purchase of detector dogs) to meet the perceived needs.	This comment addresses the merits of the alternatives and adequacy of the EIS. When the Air Force makes its decisions, a ROD, which will address mitigation commitments will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
P3-06	...I question the number of key responsibilities assigned to ... the Wildlife Management Specialist. ... I suggest that 2-3 new staff positions be created (and filled) in order to fulfill the duties associated with the proposed conservation measures.	Please see response to A3-08.
P3-07	A snake-proof perimeter [of the Base] barrier would provide the Air Force with an excellent opportunity to cut the costs of BTS interdiction on military personnel, improve base security, and concurrently take a real step toward the recovery of endangered and threatened wildlife on Guam.	This comment addresses the merits of the alternatives. The alternatives apply only to the areas of the Base that could be affected by the project.
Specific Issues		
P3-08	Table 4.5-2 should also list the captive breeding program on Guam for the Guam rail, the Micronesian kingfisher and the Mariana crow.	This comment addresses the adequacy of the EIS. The FEIS was improved by revising Table 4.5-2 as suggested by the commenter.
P3-09	Table 4.5-4 lists 25.7 ha of Mariana crow habitat as subject to clearance, which is not consistent with the text on pp 4-65 (57.5 ha of potential habitat to be cleared).	See response to A3-45.
P3-10	Both of the above tables [4.5-2 and 4.5-4] are misleading because the cumulative impacts of the projects on Andersen affect at least twice as much habitat as is given.	See response to A3-45.

P3-11	...it is misleading for the Draft EIS to state of imply (as on pp.4-65) that loss of any of the habitat remaining to these endangered species [Mariana crow – Mariana fruit bat] will not affect the populations or the recovery of the species.	See response to A3-03.
P3-12	I think that much of what is written in lines 5-23 on pp. 4-66 is probably not appropriate to the situation on Guam and should be omitted.	This comment addresses the merits of the analysis. This segment of text in Subchapter 4.5.1.3 summarizes the best available knowledge to date on noise effects on Mariana crows. Use of related information is accepted by the Section 7 Handbook. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."
P3-13	The claim that conservation measures described in Chapter 2 would "reverse the continued degradation...of important habitat" and that "species would utilize the better-quality habitat" (pp. 4-69 and 4-70) imply a degree of certainty that is not shared by all workers. These statements are probably too strongly worded.	This comment addresses the merits of the analysis. The analysis in the FEIS supports the statement that ungulate management within ungulate exclosure units would reverse the continued degradation of forest habitat and encourage forest recovery through recruitment of saplings into upper canopy layers. The October 3, 2006 USFWS Biological Opinion states that "...the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force." Based on the second excerpt, the Air Force improved and modified text in the FEIS to: "species may utilize the better-quality habitat."
P3-14	With respect to bird/wildlife-aircraft strike hazard, ... I would like to see the Draft EIS discuss the likelihood of interactions at low altitudes, for instance, on take-off and landing, when planes are most likely to run into birds.	This comment addresses the adequacy of the EIS. The FEIS was improved by adding detail to Subchapter 3.11.3 concerning bird/wildlife-aircraft strikes and the altitudes at which they occur.
P4-Mr. Antonio Sablan		
P4	Oral comment provided during June 1, 2006 public hearing. Concern regarding the safety of the people of Guam with regards to military buildup on Guam and that his family was not duly compensated for land condemnation by U.S. government in the acquisition of Andersen AFB lands.	See response to comment O1-03 concerning the safety of the people of Guam with respect to the military buildup on Guam. The issue of compensation mentioned in the comment is not related to the establishment and operation of the ISR/Strike capability at Andersen AFB.
P5-Mr. Cole Herndon		
P5	Oral comment provided during June 1, 2006 public hearing. Comments regarding preservation of cultural resources	This comment addresses the adequacy of the EIS. As noted in Subchapter 3.9 of the DEIS and FEIS, the Air Force manages cultural resources in accordance with regulatory guidance and has developed an ICRMP for Andersen AFB. Subchapters 1.2.5 and 4.9.1 reflect the completion of a cultural resources survey as well as the concurrence from the GSHPO that no further archaeological work will be necessary, thereby completing Section 106 consultation.

P6-Mr. Cole Herndon

P6	Written comment provided at June 1, 2006 public hearing. Construction projects should be monitored for cultural resources.	See response to comment P5. Additionally, the analysis in Subchapter 4.9.1 of the FEIS was improved by including text outlining the procedures contractors would follow should inadvertent discovery of a cultural resource occur.
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Comments Received from GovGuam Bureau of Statistics and Plans from Review of the Coastal Zone Management Assessment Form Submitted by Andersen AFB on August 30, 2006

1. The clearing of 73.9 hectares of native forest critical to endangered species habitat.	The comment addresses the adequacy of the EIS. As stated in Subchapter 4.5.1.3, vegetation clearing would remove less than approximately 1.6 percent of the combined area of the GNWR Ritidian Unit and refuge overlay units. Additionally, as discussed in Subchapter 4.5.1.3, implementation of the conservation measures would reverse the continued degradation of approximately 200 hectares (494 acres) of important habitat, and therefore, contribute to the recovery of listed species. The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."
2. The location of proposed 190 family housing units need to be more clearly delineated.	This comment addresses the adequacy of the EIS. Figure 2.2-3 of the FEIS was improved to show that the housing complex would not be located in forested habitat. Additionally, Subchapter 2.2.1.2 of the EIS was improved by stating the location reflects the results of a June 2005 reconnaissance survey involving Air Force and DAWR staff.
3. Identification of funding base as well as support staff to implement the duties of the Wildlife Management Specialist.	This comment addresses the merits of the alternatives and adequacy of the EIS. When the Air Force makes its decisions, a ROD, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.
4. Inclusion of assurances that reintroduction of endangered species to native habitat will not be impeded by the proposed project.	This comment addresses the merits of the alternatives. There are no reintroduction efforts underway at Andersen AFB. The conservation measures defined in Subchapter 2.2.1.2 of the FEIS are intended to make the refuge compatible with species reintroduction and subsequent recovery. The refuge would offer a potential location for reintroduction of the Guam Rail and/or the Micronesian kingfisher. The actual reintroduction would be accomplished by DAWR (as was done in 2003 for the Guam Rail). The October 3, 2006 USFWS Biological Opinion states that implementation of the ISR/Strike project "...is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA."
5. The need for the Air Force to ensure that funding for the installation of the snake barrier is made part of the action.	This comment addresses the merits of the alternatives and adequacy of the EIS. When the Air Force makes its decisions, a ROD, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force. Funding for mitigation measures will be treated as priority items in requests for appropriations.

<p>6. Consider also on the “Noise Impact Study” the potential impact of bats abandoning the Pati Point colony site, and the development of appropriate measure, including offsite mitigation, to offset the impact, if it occurs.</p>	<p>This comment addresses the merits of the EIS. The Air Force improved and modified the FEIS by including the Incidental Take Statement issued by the USFWS in the Biological Opinion, which considered colony abandonment, as a new Subchapter 4.5.1.4. Additionally, the non-discretionary terms and conditions from the BO were included as mitigation in Subchapter 4.5.4 of the FEIS. The BO was included in Appendix E of the FEIS.</p>
<p>7. Although DAWR supports the efforts to conduct the Brown Tree Snake trapping and Introduction and Control, at Pati Point, they feel that it should be coordinated so that not only traps are used, but also the best available techniques and methods are incorporated to minimize impacts to the fruit bats. ITS control (using traps and other methods) should not be done by the Wildlife Management Specialist. It should be contracted to USDA or another qualified agency. Additionally, research scope and direction of NARC efforts should be determined by DOD, Wildlife Services Operations, NWRC, DAWR, and USFWS through annual and multi-year goals with discrete, specific goals.</p>	<p>This comment addresses the merits of the alternatives and adequacy of the EIS. The conservation measure in Subchapter 2.2.1.2 includes Air Force cooperation with other agencies to determine the most appropriate method of BTS control at Pati Point. The October 3, 2006 USFWS Biological Opinion states that “...the Service’s finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force.” With regard to who will accomplish snake control, the Air Force will continue to coordinate BTS interdiction with federal agencies in accordance with the Andersen AFB Brown Tree Snake Management plan.</p>
<p>8. Feral cats are detrimental to the recovery of the flightless Guam rail. There’s a need to regulate/document the location of family pets, b y registering with the Air Force Veterinarian upon arrival at AAFB and also when the owner’s leaves/relocate. They should be made responsible in reporting to the veterinarian and transfer of ownership to new owner or death of the pet.</p>	<p>See response to comment A3-26.</p>
<p>9. DP5. Hazardous Areas states that “Interior noise at the schools could be reduced through mitigative measures. Would Andersen fund the insulation of the schools in the impacted areas?”</p>	<p>This comment addresses the adequacy of the EIS. Subchapter 3.2 was improved by better explaining how the AICUZ program works, to include how recommendations of the AICUZ study should be used by the local community to plan, zone, and mitigate aircraft noise. When the Air Force makes its decisions, a ROD, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force. The Air Force does not have the authority to add noise attenuation in facilities that are not on Air Force property.</p>
<p>10. Need to ensure that all the mitigation actions are COMPLETELY funded.</p>	<p>This comment addresses the merits of the alternatives and adequacy of the EIS. When the Air Force makes its decisions, a ROD, which will address mitigation commitments, will be prepared. Mitigation measures adopted in the ROD will be implemented and monitored by the Air Force.</p>

<p>This document has indicated that the survey of archaeological resources has not been done, which is the DRR's Historic Office concern. Section 106 consultation and development of a Memorandum of Agreement is needed for this project.</p>	<p>This comment addresses the adequacy of the EIS. The analysis in the FEIS was improved and modified by updating Subchapters 1.2.5 and 4.9.1 of the FEIS to reflect completion of a cultural resources survey, as well as the concurrence from the GSHPO that no further archaeological work will be necessary, thereby completing Section 106 consultation.</p>
<p>GEPA also has some environmental issues that need to be addressed, such as the water runoff, particularly with regard to impacts on the Guam Aquifer Recharge Area/Northern Water Lens and erosion control measures planned to curtail proposed construction impacts on Guam's water resources which must be described in detail in the Final EIS.</p>	<p>This comment addresses the adequacy of the EIS relative to stormwater. The FEIS was improved as suggested by the commenter by revising the third to the last paragraph of Subchapter 4.4.1.4 of the FEIS with the information in the comment. Additionally, the FEIS was improved as suggested by the commenter by revising the second paragraph of Subchapter 3.6 of the FEIS with supporting text as suggested by the commenter.</p>

APPENDIX C INSTALLATION RESTORATION PROGRAM DATA

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INSTALLATION RESTORATION PROGRAM DATA

Table C-1 Installation Restoration Program Sites, Areas of Concern, Solid Waste Management Unit, and Other Sites at Andersen AFB

Site	Description/Materials Disposed	Status
Installation Restoration Program Sites		
1 (LF-1)	Landfill (LF) used for sanitary trash, waste POL, waste chemicals, waste solvents, ferrous metals, construction debris.	Responsibility transferred to Compliance Program. LF-1 is still active, except for non-active portions, which were capped in 2001.
2 (LF-2, LF-4, & LF-5)	Sanitary trash, waste POL, solvents, chemicals, pesticides, ferrous metal, construction debris, UXO	Landfill 5 capped under Removal Action LF2 Remedial Action Complete
3 (WP-3)	Waste POL, solvents, industrial wastes, pesticides, sanitary trash, scrap metal, construction debris	No Further Response Action Planned
4 (LF-6)	Sanitary trash	No Further Response Action Planned
5 (LF-7)	Sanitary trash	Removal Action completed
6 (LF-8)	Asphalt and asphaltic wastes and metals	Asphaltic wastes removed to allow further study of site. EE/CA has been completed
7 (LF-9)	Sanitary trash, concrete construction debris	No Further Response Action Planned
8 (LF-10, LF-11 LF-12)	Asphalt wastes, scrap metals, empty 55 gallon drums, sanitary wastes, construction debris, occasional waste POL and solvents	In Remedial Action process
9 (LF-13)	Sanitary trash, spent equipment waste, POL and unknown chemical wastes	EE/CA has been completed
10 (LF-14)	Concrete debris, construction debris, metals, PAHs	Removal Action on hold due to funding.
11 (LF-15, LF-16)	Sanitary trash, construction debris (1960s) Solvents (1970s) Drums of lead based paint, solvents discovered in 1981	No Further Response Action Planned
12 (LF-17)	Sanitary trash, construction debris (1960s) Solvents (1970s) Drums of lead based paint, solvents discovered in 1981	No Further Response Action Planned
13 (LF-18)	Asphaltic waste and waste liquids, metals	In RI/FS process
14 (LF-19)	50 to 70 drums of asphalt	EE/CA has been completed
15 (LF-20)	Sanitary trash	EE/CA has been completed
16 (LF-21)	Sanitary trash	Remedial action completed
17 (LF-22)	Sanitary trash, unknown quantities of UXO and black powder	Site was designated as an Area Below Action Levels and was deemed a Category III no further response action planned (NFRAP).
18 (LF-23)	Sanitary trash	Sanitary trash
19 (LF-24)	Sanitary trash, other types?	Sanitary trash, other types?

Table C-1 Installation Restoration Program Sites, Areas of Concern, Solid Waste Management Unit, and Other Sites at Andersen AFB (continued)

Site	Description/Materials Disposed	Status
Installation Restoration Program Sites		
20 (WP-7/LF-25)	Sanitary trash, waste POL solvents, scrap vehicles and equipment, construction debris, waste dry cleaning fluids	Remedial Action complete
21 (LF-26)	Sanitary trash and construction debris	No Further Response Action Planned
22 (WP-6/LF-27)	Construction debris, metals	Remedial Action in progress
23 ((WP-5/LF-28)	Construction debris and auto bodies	No Further Response Action Planned
24 (LF-29)	Littered with household debris and garbage	Remedial Action complete
25 (FTA-1)	Waste solvents, contaminated fuels	No Further Response Action Planned
26 (FTA-2)	Contaminated JP-4, MOGAS, diesel fuel waste POL and solvents	EE/CA has been completed
27 (HW-1)	Storage of POL and solvents Storage of hazardous wastes	No Further Response Action Planned
28 (CS-1)	Deteriorating drums of asphaltic tar	In RI/FS process
29 (WP-2/CS-2)	UXO and solvents	No Further Response Action Planned
30 (WP-4/CS-3)	Waste oils and solvents	Removal action completed
31 (CS-4)	Current drum storage area POL products and solvents	Responsibility transferred to Compliance Program
32 (DS-1)	Storage of drums of asphalt, paint, oil, tar contaminated soil from UST removals	Responsibility transferred to Compliance Program
33 (DS-2)	Storage of drums of asphalt, paint, oil, tar contaminated soil from UST removals	Responsibility transferred to Compliance Program
34 (N/A)	Used for removal of oil from electrical equipment and storage	Removal action completed
35 (WP-1)	Several thousand deteriorated drums of asphaltic tar	In RI/FS process
36 (N/A)	Not known	EE/CA has been completed
37 (War Dog Pit)	Not reported	No Further Response Action Planned
38 (MARBO Laundry)	Former laundry facility	Remedial Action complete
39 ((Harmon Substation)	Not known	Removal Action complete
40 (Urbana Dumpsite)	Trash, aircraft parts, tires, auto parts, bombs and UXO, drums, and construction debris	Proposed Plan completed. In ROD process
41 (OPS Support Bldg 1)	Area of former operational support buildings, including tool shops, a carpenter shop, a generator shop, a heavy vehicle shop, and vehicle maintenance shops Former laundry facility	In RI/FS process
42 (OPS Support Bldg 2)	Area of a former gas station with two associated rusted aboveground storage tanks (AST).	In RI/FS process
43 (OPS Support Bldg 3)	Area of a former location of operational support buildings, including a sign paint shop, battery shop, refrigeration shop, plumbing shop, electric shop, carpenter shop, welding shop with a concrete vault, motor pool building garage, grease stand, machine shop, preventative maintenance shops, generator shack, paint shed, shed, steam shop and warehouses.	In RI/FS process

Table C-1 Installation Restoration Program Sites, Areas of Concern, Solid Waste Management Unit, and Other Sites at Andersen AFB (continued)

Site	Description/Materials Disposed	Status
Areas of Concern, Solid Waste Management Units, and Other Sites		
AOC-65	Septic system, unknown materials	In PA/SI process
AOC-67	Recovery tank, unknown materials	In PA/SI process
AOC-68	Fuel Storage tanks and piping, unknown materials	In PA/SI process
AOC-69	Stormwater retention pond, unknown materials	In PA/SI process
AOC-80 (DP058)	Clearing west of Housing area, surface debris such as grease cans, metal debris, and glass bottles near a cleared area., also may contain aluminum, beryllium, copper, lead, and manganese	In PA/SI process
AOC-83	Tank Farm Northwest Field OU, unknown materials	In PA/SI process
AOC-84 (DA060)	Northwest Field, may contain manganese contaminated soils.	In PA/SI process
AOC-85 (SS061)	Building 2084, unknown materials. See SS061.	In PA/SI process
AOC-93	South Runway Approach Zone. See LF062.	In PA/SI process
AOC-94 (LF063)	UXO, unknown materials. See LF063.	In PA/SI process
AOC-99 (SS064)	Service Apron H and Quonset Huts, unknown materials. See SS064.	In PA/SI process
AOC-105 (LF074)	Building 18006, unknown materials. See LF074.	In PA/SI process
AOC-106	Area outside LF-1, unknown materials	In PA/SI process
AOC-101	400-foot trench, unknown materials	In PA/SI process
AOC-102	Cliff line, unknown materials	In PA/SI process
AOC-103	Waste pile, unknown materials	In PA/SI process
AOC-104	Quarry, unknown materials	In PA/SI process
AOC-105	Coral dump site, unknown materials	In PA/SI process
AOC-106	Asphalt drum area, unknown materials	In PA/SI process
AOC-107	Asphalt drum area & OEW area, unknown materials	In PA/SI process
AOC-108	Abandoned sewage disposal sinkhole, unknown materials	In PA/SI process
AOC-109	Quarry cliff line, unknown materials	In PA/SI process
AOC-110	Waste pile, unknown materials	In PA/SI process
AOC-1	Building 19017; hazardous waste storage facility drums	Further investigation needed.
AOC-2 (SWMU 45)	Hazardous waste accumulation storage area	Further investigation needed.
AOC-3	Urunao; Beach dump (moved to IRP list); UXO, aircraft parts, construction debris, waste drums	Further investigation needed.
AOC-4	Building 9016, asbestos disposal trench, contaminated soil	Further investigation needed.
AOC-5	North Field trench of ESI Site 4, contaminated soil,	Further investigation needed.
AOC-7A	Building 18006, aircraft maintenance shop battery shop	Further investigation needed.
AOC-7B	Building 18006, aircraft maintenance shop USTs	UST removed, Further investigation needed.
AOC-7C	Building 18006, aircraft maintenance shop, waste products storage area	Further investigation needed.
AOC-7D	Building 18006, aircraft maintenance shop degreasing unit	Further investigation needed.
AOC-8	Building 2550; former FTA 3	Further investigation needed.

Table C-1 Installation Restoration Program Sites, Areas of Concern, Solid Waste Management Unit, and Other Sites at Andersen AFB (continued)

Site	Description/Materials Disposed	Status
AOC-9	Northwest Field oil blending facility	Further investigation needed.
AOC-10 TO 37	Areas of Concern	Unknown.
AOC-29	Building 18018; hazardous waste storage area	Unknown.
SWMU-2	Base wide sanitary sewer system	
SWMU-4	Building 19015; Outside aircraft wash rack oil/water separator; water soluble detergents , Stoddard solvent	Active
SWMU-6	Building 18027; Outside drum storage area; oils, solvents	Active
SWMU-7	Building 18017; inside wash rack oil/water separator, water soluble detergents, solvent PD 380, oils	Active
SWMU-8A	Building 18004; Outside drum storage area	Active
SWMU-8B	Building 18004; East oil/water separator	Active
SWMU-8C	Building 18004; West oil/water separator	Active
SWMU-9	Building 18006; Outside drum storage area; Stoddard solvents, hydraulic fluid, solvents (types unknown)	Active
SWMU-10	Building 17006; nondestructive inspection lab outside drum storage area, developer solution, fixer solution, Stoddard solvent, zyglo penetrant, zyglo emulsifier, TCE, kerosene, film.	Active
SWMU-11	Building 20021 roads and grounds outside drum storage area, lube oil, aircraft cleaning diesel fuel	Active
SWMU-12	Building 18040; corrosion control outside drum storage area, paint thinners, paints	Active
SWMU-13A	Building 2600; equipment maintenance outside drum storage area, lube oil, Stoddard solvents, hydraulic fluid, brake fluid, paint thinners	Active
SWMU-13B	Building 2600; equipment maintenance oil/water separator, lube oil, Stoddard solvents, hydraulic fluid, brake fluid, paint thinners	Active
SWMU-15	Building 2550/52; Oil/Water Separator (no longer in use), JP-4 Fuel Stoddard Solvent Engine/Hydraulic Lubricants Aircraft-Cleaning Compound	No longer in use.
SWMU-16A	Refueling Maintenance Oil/Water Separator, waste JP-8, waste MOGAS	Active
SWMU-16C	Building 26229; Refueling Maintenance Waste Oil Storage Tanks, waste oil	Active
SWMU-17	Building 26051; Auto Hobby Shop Oil/Water Separator, lube oil	Active
SWMU-18	Building 14507; Outside Drum Storage Area, contaminated fuels, fuels sludge	Active
SWMU-20D	Service Station Outside Drum Storage Area, lube oil, grease, Stoddard solvent, ethylene glycol, tires, brake linings, batteries	Active
SWMU-20E	Building 26101; Service Station in-ground sumps and trenches; lube oil, grease, Stoddard solvent, ethylene glycol, tires, brake linings, batteries	Active
SWMU-21	Building 26000/01; incinerator, photographic solutions	Active
SWMU-22A	Building 18017; Aircraft Corrosion Control inside drum storage area; paint thinners, MEK, toluene, adodine solution, chromic acid, detergents	Active

Table C-1 Installation Restoration Program Sites, Areas of Concern, Solid Waste Management Unit, and Other Sites at Andersen AFB (continued)

Site	Description/Materials Disposed	Status
SWMU-22B	Building 18017; Aircraft Corrosion Control inside storage room, paint thinners, MEK, toluene, adodine solution, chromic acid, detergents	Active
SWMU-22C	Building 18017; Aircraft Corrosion Control Outside Drum Storage Area, paint thinners, MEK, toluene, adodine solution, chromic acid, detergents	Active
SWMU-23A	Building 18004; Non-powered AGE Hazardous Waste Satellite Accumulation Point, stoddard solvent aircraft cleaning compound hydraulic fluid, lube oil	Active
SWMU-23B	Building 18004; non-powered AGE used petroleum products area, stoddard solvent aircraft cleaning compound hydraulic fluid, lube oil	Active
SWMU-23C	Building 18004; Jet Engine Support; Aircraft Cleaning Compound, Stoddard Solvent, TCE	Active
SWMU-23D	Building 18004; Jet Engine Intermediate Maintenance; Hydraulic Fluid, •Contaminated Fuels, •Stoddard Solvent, Carbon Remover, Lube Oil	Active
SWMU-23E	Building 18004; Engine Conditioning; Waste JP-4, •Lube Oil	Active
SWMU-23F	Building 18004; Fuels Systems Maintenance; MEK, MIBK	Active
SWMU-25	Building 17000; Defensive Fire Control Drum Storage Area; TCE, PCE, Lube Oil, Stoddard Solvent	Active
SWMU-27	Building 18040; Corrosion Control Hazardous Waste Accumulation Area Flammable Storage Room; Paint Thinners, Paint Slops	Active
SWMU-28	Building 2600; Equipment Maintenance Accumulation Point; Lube Oil, Stoddard Solvents, Hydraulic Fluid, Brake Fluid, Paint Thinners	Active
SWMU-29A	Building 2799; Industrial Corrosion Control Drum Storage Area, MEK, Lacquer Thinner, Cellulose Thinner, Paint Slops, Alodine Solution, Chromic Acid, Water-soluble Detergents, Paint Stripper	Active
SWMU-29B	Building 2799; Industrial Corrosion Control Hazardous Materials Storage Areas and Associated Spill Areas, MEK, Lacquer Thinner, Cellulose Thinner, Paint Slops, Alodine Solution, Chromic Acid, Water-soluble Detergents, Paint Stripper	Active
SWMU-29C	Building 2799; Industrial Corrosion Control Septic System, MEK, Lacquer Thinner, Cellulose Thinner, Paint Slops, Alodine Solution, Chromic Acid, Water-soluble Detergents, Paint Stripper	Active
SWMU-30C	Building 23022; Aerospace Ground Equipment Oil/Water Separator and Settling Tank, Various Solvents, Sulfuric Acid, Lube Oil, Waste Fuel, Synthetic Oil, Ethylene Glycol, Aircraft Cleaning Compound, Tires, Oil Filters, Hydraulic Fluid	Active
SWMU-30D	Building 23022; Aerospace Ground Equipment Drum Storage Area, Various Solvents, Sulfuric Acid, Lube Oil, Waste Fuel, Synthetic Oil, Ethylene Glycol, Aircraft Cleaning Compound, Tires, Oil Filters, Hydraulic Fluid	Active

Table C-1 Installation Restoration Program Sites, Areas of Concern, Solid Waste Management Unit, and Other Sites at Andersen AFB (continued)

Site	Description/Materials Disposed	Status
SWMU-31A	Building 26329; Refueling Maintenance Drum Storage Area, Waste JP-8, Waste MOGAS, Lube Oil, Transmission Fluid	Active
SWMU-31B	Building 26229; Refueling Maintenance Spill Site	Active
SWMU-32A	Building 26051; Auto Hobby Shop Inside Drum Storage Area, Lube Oil, Grease, Stoddard Solvent, Brake Pads, Ethylene Glycol, Batteries	Active
SWMU-32D	Building 26051; Auto Hobby Shop Used Petroleum Products Storage Area, Lube Oil, Grease, Stoddard Solvent, Brake Pads, Ethylene Glycol, Batteries	Active
SWMU-32E	Building 26051; Auto Hobby Shop Abandoned Car Storage Area, Lube Oil, Grease, Stoddard Solvent, Brake Pads, Ethylene Glycol, Batteries	Active
SWMU-32G	Building 26051; Auto Hobby Shop Used Battery Storage Area, Lube Oil, Grease, Stoddard Solvent, Brake Pads, Ethylene Glycol, Batteries	Active
SWMU-33	Building 26203; Fuels Laboratory, miscellaneous. bowser, petroleum ether, waste mixed fuels	Active
SWMU-34A	Building 26224; LOX Facility Oil/water Separator, Freon 113	Active
SWMU-34B	Building 26224; LOX Facility Septic tank and Leach Field, Freon 113	Active
SWMU-35A	Building 18002; Bomb Renovation Inside Storage Area, Paint Thinner, Paint-booth sludge, Sandblast Residue	Active
	Building 18002; Paint Shop Inside Storage Area, Paint Slops, Paint Thinner, Paint-booth Sludge, Empty Paint Cans	Active
	Building 18002; Refrigeration Shop Inside Storage Area, TCE, Freon, Lube Oil	Active
SWMU-35B	Building 18002; Bomb Renovation, Paint Shop, and Refrigeration Shop, Outside Storage and Staging Area; TCE, Freon, Lube Oil	Active
SWMU-37A	Building 9004; Line Delivery and Handling Vehicle Maintenance Pit, Stoddard Solvent, Lube Oil, Grease	Active
SWMU-39	Building 18029; Corrosion Control Shop, MEK, Toluene, Lacquer Thinner, Paint Slops (lead based), Paint Strippers, Aircraft Cleaning Compound	Active
SWMU-40B	Building 20021; Roads and Grounds (and Heavy Equipment Shops), Flammable Materials Storage Room, Lube Oil, Aircraft Cleaning Compound, Diesel Fuel	Active
SWMU-40C	Building 20021; Roads and Grounds (and Heavy Equipment Shops), Equipment Washing Area –Wash rack, Lube Oil, Aircraft Cleaning Compound, Diesel Fuel	Active
SWMU-41	Building 17002; Fire Protection Branch, Fire Extinguisher Agent, Chlorobromomethane, Potassium bicarbonate, Aircraft Cleaning Compound	Active
SWMU-42B	Building 18001; Oil/Water Separator,	Active
SWMU-42C	Building 18001; Battery Shop, Battery Acid, Battery Carcasses	Active
SWMU-42D	Building 18001; Hazardous Waste Satellite Accumulation Point,	Active
SWMU-42E	Building 18001; Drum Storage Area	Active
SWMU-42F	Building 18001; Vehicle Salvage Area	Active

Table C-1 Installation Restoration Program Sites, Areas of Concern, Solid Waste Management Unit, and Other Sites at Andersen AFB (continued)

Site	Description/Materials Disposed	Status
SWMU-43	Building 14526; Dumpster Wash rack	Active
SWMU-44	Building 18020; Hanger Oil/Water Separator	Active
SWMU-46A	Building 26204; POL Wash rack Oil/Water Separator	Active
SWMU-46B	Building 26204; POL Wash rack Outside Drum Storage Area	Active
SWMU-47C	Northwest Field; Power Plant Waste Oil Storage	
SWMU-53B	Andersen 1 Tank Farm; Drums	
SWMU-53C	Andersen 1 Tank Farm; Drums	
SWMU-53D	Andersen 1 Tank Farm; Discharge	
SWMU-53F	Andersen 2 Tank Farm; Miscellaneous Pit	
DA076	Area proposed for ISR/Strike Commercial Gate.	Site under evaluation and technical report expected in 2005. Preliminary data indicates hotspots for metals contamination (lead and cadmium)
DP067	Former ESI Waste Pile 8 - West of Northwest Field. The area is an inactive disposal site located in a quarried area between the North Runway and North Taxiway at Northwest Field. Inspection of the area indicated the presence of drums, tires, canisters, and an asphalt pile north of the North Runway.	Not evaluated yet
DP068	Former ESI WP-9 Northwest Field. The area is identified as an inactive waste disposal site in a former borrow pit located south of the North Runway in Northwest Field. Waste materials identified in the area include empty 55-gallon drums.	Not evaluated yet
DP069	Former ESI WP-10 Northwest Field. During reconnaissance of Northwest Field, a pile of discarded 55-gallon drums was identified approximately 600 feet northeast of the Southwest Cross-Over at the South Runway. This pile was determined to be an inactive disposal site, and the drums were partially buried under crushed coral and soil.	Not evaluated yet
DP081	Former ESI WP-11 Northwest Field. The area is identified as an inactive waste disposal site. Waste observed in the disposal site included metal debris, domestic trash, metal objects, canisters, buckets, and at least one gas cylinder. These materials were partially covered with soil and crushed coral.	Not evaluated yet
DP082	Former ESI WP-12 Northwest Field. The area is identified as a waste pit observed to contain a variety of waste materials, including 55-gallon drums, telephone poles, electrical components, metal scrap, and construction debris.	Not evaluated yet
DP084	Former ESI WP-14 Northwest Field. A drum pile was identified inside a former quarry located approximately 150 feet from the intersection of 6th and A Streets, dependent housing, in Northwest Field. The drums were rusty but still intact. The western edge of the quarry contains approximately 20 drums. Because no samples were taken during the ESI investigation, there is no information to support the site's relative risks.	Not evaluated yet

Table C-1 Installation Restoration Program Sites, Areas of Concern, Solid Waste Management Unit, and Other Sites at Andersen AFB (continued)

Site	Description/Materials Disposed	Status
GR002	Former AOC-91. Grenade range site. This is a military munitions response (MMR) site. Potential presence of spent ordnance. Metals slightly above action levels.	Remedial Action Needed.
LF062	Former AOC-93 - South Runway Approach Zone. The area is identified as an AOC due to the presence of surface waste debris such as glass bottles and scrap metal near a group of trenches and mounds and due to the suspected disposal of ordnance at the 380-acre area. Aluminum, beryllium, total chromium, and manganese results are greater than the BTVs and residential PRGs. Further soil remediation or removal action is needed in a few COC-impacted areas.	Being evaluated
LF063	Former AOC-94 - UXO. The area is identified as an AOC due to the suspected disposal of hazardous materials near a group of concrete pads identified as remnants of carpentry, sheet metal, machine, plumbing, and electrical shops. Further investigation is needed to characterize the existence of UXO contamination or its potential for a release into the environment.	Being evaluated
LF074	Former AOC-I05 - MSA Coral Dump Site. The area is 50 acres in size. The area contains scrap metal, ordnance and explosive waste, UXO, auto parts, aircraft engine parts, corrugated sheet metal, and deteriorated drums.	Being evaluated
ML001	Former AOC-81. Machine gun range site and an MMR site. Soil has elevated levels of metals.	Remedial Action Needed.
SS061	Former AOC-85 - Building 20844. The area is identified as an AOC due to the presence of surface waste debris such as metal and construction debris near an area with four debris mounds. Antimony, beryllium, manganese results are greater than the BTVs and residential PRGs. Further soil remediation or removal action is needed in a few COC-impacted areas.	Being evaluated
SS064	Former AOC-99 - Service Apron "H" and Quonset Huts. The area is identified as an AOC due to the suspected disposal of hazardous materials near a group of concrete pads identified as remnants of carpentry, sheet metal, machine, plumbing, and electrical shops. Benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-d)pyrene, copper, and manganese results are greater than the BTVs and residential PRGs. Further soil remediation or removal action is needed.	Hot spot removal required
TA086	Former ESI AOC-15, 16, & 20. Above Ground Storage Tank Northwest Field. Four aboveground storage tanks were identified in the area. Two tanks are located inside an earthen berm. The tanks were identified as out of service, and there is no information pertaining to their operation or former contents. A drum disposal area was also identified inside a quarry. The drums contained petroleum waste materials.	Not evaluated yet FY06

Table C-1 Installation Restoration Program Sites, Areas of Concern, Solid Waste Management Unit, and Other Sites at Andersen AFB (continued)

Site	Description/Materials Disposed	Status
TT085	Former ESI AOC-13 Underground Storage Tank Northwest Field. One underground storage tank was identified in the vicinity of the former flight line facilities. The tank appeared to be inactive, although fluid was observed inside it.	Not evaluated yet
WM-087	Former ESI AOCs -23,-24,-25,-26, & -27 - Mixed Waste Area Northwest Field. Two waste piles, an asphalt pile, abandoned drums and a trench used for household waste were identified south of Northwest Field. Waste observed included metal drums, wood, telephone poles, and metal and concrete debris.	Not evaluated yet

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Andersen AFB, Guam

 Area of Concern

Note: Locations are approximate.

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**APPENDIX D
SECTION 106 CONSULTATION AND
EXECUTIVE SUMMARY FOR CULTURAL RESOURCES INVENTORY**

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SECTION 106 CONSULTATION AND EXECUTIVE SUMMARY FOR CULTURAL RESOURCES INVENTORY

In compliance with Section 106 of the NHPA and Protection of Historic and Cultural Properties, the Air Force initiated coordination with the Guam State Historic Preservation Officer (GSHPO) in a letter received by the GSHPO on March 23, 2005. The Air Force sent an additional request for a consultation letter to the GSHPO on July 26, 2005. The letter also stated that the Air Force will conduct an archaeological review for the area of potential effect (APE); a work plan and research design will be submitted if any additional field work is required; and the Air Force will submit a letter of concurrence/non-concurrence based on the finding of the archaeological review. In a September 14, 2005 letter, the GSHPO mentioned that most of Andersen AFB main base has been developed and little archaeological sites are expected. The letter did state there are some buildings/structures that have been evaluated as “significant” under the NRHP criteria and that the Air Force buildings/structures that would be demolished are not historically significant. The GSHPO provided comments to the research design for the cultural resources inventory survey in an April 14, 2006 letter. A May 8, 2006 from the GSHPO to Andersen AFB stated that the final research design sufficiently addressed comments identified in the April 14, 2006 letter. The Air Force, with the assistance from the GSHPO, accomplished a Section 106 review process that included a survey to identify and record significant historical, architectural and archaeological sites in the ISR/Strike area. An Executive Summary for Cultural Resources Inventory, which contains the findings of the survey and management recommendations, was forwarded to the GSHPO on September 6, 2006. Based on review of the Executive Summary, the GSHPO responded in an October 3, 2006 letter that “further archaeological investigation on prehistoric sites at ISR/Strike will not provide any new information about the project area, but such an investigation will only be redundant to what we already know about the project.”

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RECEIVED
MAR 22 2005 11:25
DEPARTMENT OF THE AIR FORCE
36TH CIVIL ENGINEER SQUADRON (PACAF)
ANDERSEN AIR FORCE BASE, GUAM 96543
Historic Resources Division
DPR

MEMORANDUM FOR GUAM HISTORIC PRESERVATION OFFICER

Bldg. 13-8, Tiyan
P.O. Box 2950
Hagatna, Guam 96932
GHPO

FROM: 36 CES/CEVN
UNIT 14007
APO AP 96543-4007

SUBJECT: Basing Initiatives Andersen Air Force Base (AFB), Guam

1. In compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA) and Protection of Historic and Cultural Properties as 36 CFR Part 800, the Air Force (AF) is formally starting the coordination efforts between our respective offices. Our objective is to effectively balance the new mission needs and any cultural preservation requirements at Andersen AFB that may arise from our proposed basing initiatives.
2. The AF proposes two separate basing initiatives at Andersen AFB. First, the basing of non-aircraft related training and support units at Northwest Field. This initiative enables co-location of three geographically separated organizations at Guam. Secondly, the AF proposes to increase aircraft presence on the main base area of Andersen AFB. The new aircraft's mission is to establish an intelligence, surveillance, reconnaissance, strike, and refueling capability in the Pacific region.
3. We look forward to this important partnership. If you have any questions or concerns regarding this action, please contact me at 671-366-3049 or email: dana.lujan@andersen.af.mil.

Sincerely,

DANA T. LUJAN, GS-12
Chief, Conservation Resources



RECEIVED DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 36TH AIR BASE WING (PACAF)
UNIT 14007, APO AP 96543-4007

SEP 01 2005

Historic Resources Division
DPR

Lt Col Marvin Smith
36th Civil Engineer Squadron
Unit 14007
APO AP 96543

26 July 2005

Ms. Lynda B. Aguon
Guam Historic Preservation Officer
Bldg. 13-8, Tiyan
P.O. Box 2950
Hagatna, Guam 96932

Dear Ms. Aguon

Initial coordination efforts mentioned in the letter received by your office on 23 March, 2005 informed your office of future, proposed actions at Andersen AFB. In accordance with Section 106 of the National Historic Preservation Act of 1996, the Air Force requests consultation with your office regarding the proposal to construct new aircraft and mission support facilities, and to demolish facilities that are no longer required.

The Air Force has contracted Parsons Corporation to prepare an Environmental Impact Statement in accordance with the National Environmental Policy Act. As part of this effort, an archaeological review will be conducted for the area of potential effect. A work plan and research design will be submitted, subsequent to your approval, if any additional field work is required. Once completed, the Air Force will be submitting a letter of concurrence/non-concurrence based upon the finding of the archaeological review. If you have any questions, my POC for this project is Mr. Jonathan Wald, Natural/Cultural Resources Planner, 366-2549 or jonathan.wald@andersen.af.mil.

Sincerely

A handwritten signature in black ink, appearing to read "Marvin W. Smith, Jr.", is located below the word "Sincerely".

MARVIN W. SMITH, JR., Lt Col, USAF
Commander



Department of Parks and Recreation
Dipattamenton Plaset Yan Dibuetision
Government of Guam
490 Chalan Palasyo
Agana Heights, Guam 96910
Director's Office: (671) 475-6296/97; Fax (671) 477-0997
Parks Division: (671) 475-6288/89
Guam Historic Resources Division: (671) 475-6294/95/72; Fax
(671) 477-2822

Thomas A. Morrison
Director

Gregory A. Matanane
Deputy Director

In reply refer to RC2005-536F

September 14, 2005

Marvin W. Smith, Jr., Lt Col, USAF
Commander
Department of the Air Force
36th Civil Engineer Squadron
Unit 14007
APO AP 96543

Subject: Section 106 Consultation, New Aircraft and Mission Support Facilities
and Demolition of Facilities that are No Longer Required.

Attention: Jonathan Wald, Natural/Cultural Planner

Dear Lt. Col. Smith:


This is in reference to the above subject matter dated July 26, 2005 that we received on September 1, 2005.

This undertaking appears to be within the Andersen Air Force main base. Most of the area has been developed thus little archaeological sites are expected to be found. However, there are some buildings/structures within the base that have been evaluated as significant under the National Register criteria. You need to look at the historic survey prepared by Mason Architect for the AAFB to make sure buildings/structures that will be demolished are not historically significant. If significant buildings/structures are to be demolished there are required procedures to follow.

We await the results of your relevant archaeological/historical review and subsequently your formal Section 106 findings.

If you have further questions, please call me or Vic April, Territorial Archaeologist at 475-6294/95/72.

Sincerely,


LYNDA B. AGUON

Guam (State) Historic Preservation Officer



Department of Parks and Recreation
Dipattamenton Plaset Yan Dibuetision
Government of Guam

490 Chalan Palasyo
 Agaña Heights, Guam 96910
 Director's Office: (671) 475-6296/97; Fax (671) 477-0997
 Parks Division: (671) 475-6288/89

Guam Historic Resources Division: (671) 475-6294/95/72; Fax (671) 477-2822

Thomas A. Morrison
 Director

Gregory A. Matanane
 Deputy Director

In reply refer to:
 RC2005-536F

April 14, 2006

Jonathan Wald
 Environmental Planner
 Andersen Air force Base, Guam

Post-It* Fax Note 7671		Date 4/14/06	# of pages 5
To Jonathan Wald		From CBAguon	
Co./Dept. AA+B		Co. DPR / HPO	
Phone # 366-2549		Phone # 475-6294	
Fax # 366-5088		Fax # 477-2822	

Subject: NHPA Section 106 Review:
 Comments on Research Design for Cultural Resources Inventory
 Survey of Northwest Field and Aircraft Storage Areas, Andersen Air
 Force Base, Guam

Dear Mr. Wald:

We have reviewed the Research Design for the above subject undertaking and have the following comments.

The research Design presents some very interesting research domain and research questions. However, any research issues and questions presented in any given Research Design are developed based on relevant literature review. It is not understood how the research domain and research questions were developed. The results of the literature review should be included in the Research Design to indicate that the archaeologist has acquired the necessary information used to set up research questions and pre-survey expectations of the project area; for example, type of properties expected and looked for in the Area of Potential Effect (APE) learned through literature review of relevant information. Perhaps Geo-Marine, Inc. inadvertently excluded that information. There is a list of data needed to address the research questions. However, it is also very important that there is field as well as laboratory methodologies specified in the Research Design. The methods should detail how the data used to address the research questions will be acquired in the field and processed in the laboratory.

In the last paragraph of the last page, it states that many of the posed questions may not be answered from this particular study. Well, in any archaeological project in any area, it is not required to pose many questions. The number and type of research questions asked in a Research Design depend on the availability of data that can be used to address those specific research questions. Again, the potential type of data expected in a project area is learned through relevant literature review. It does not make sense to include questions that can not be answered by a specific study.

Some of the critical elements of the Research Design include objectives of the survey and evaluation of site significance for example, National Register criteria. The National Register criteria at 36 CFR 60.4 should be stated in the Research Design to show the reader what the evaluation of site significance will be based on. A statement indicating temporary as well as permanent repository of artifacts should

Page 2 of 2
RC 2005-536
Jonathan Wald
Cultural Inventories NWF and Aircraft Storage Areas, AAFB

also be included in the Research Design. Andersen Air Force Base has a storage facility that is housing artifacts recovered from their properties. Such artifacts might be transferred to the Guam Museum for permanent repository once there is available space at a later time. Please refer to the Secretary of the Interior Standards and Guidelines for Identification and Evaluation.

Enclosed for your information and use is our Historic Properties Survey Report Evaluation Checklist that any survey report submitted to our office is expected to address the information in it as minimum.

If you have questions please contact us at 475-6294/6295/ or 6272.

Sincerely,


Lynda Bordallo Aguon
State Historic Preservation Officer

**HISTORIC PROPERTIES SURVEY REPORT
EVALUATION CHECKLIST**

TITLE: _____

REPORT NO.: _____ FINAL REPORT RECEIVED: _____

REVIEWER: _____ DATE: _____

A. AREA/PROPERTY SURVEYED

1. Geographical Place Name (if any): _____
2. Lot No(s): _____
3. Village, Municipality: _____
4. Area (In acres): _____

NOTE: Fill out the following checklist in this manner:

- YES - Satisfactory completion of requirement
NO - Requirement not completed, or not satisfactory
N/A - If not applicable
? - If there are questions as to the adequacy of the completion of the requirement

B. INVENTORY/IDENTIFICATION RESULTS SUMMARY

1. _____ Meets SECRETARY OF INTERIOR STANDARDS
2. _____ No. of HISTORIC PROPERTIES added to INVENTORY
3. _____ No. of HISTORIC PROPERTIES updated in INVENTORY
4. _____ No. of sites evaluated meeting NATIONAL REGISTER CRITERIA
5. _____ No. of sites evaluated as NOT meeting NATIONAL REGISTER CRITERIA
6. _____ No. evaluated within HISTORIC CONTEXTS

C. SURVEY OBJECTIVES

1. _____ Field Objectives clearly stated
2. _____ Research Design clearly stated
3. _____ Historic preservation management/compliance tasks clearly stated
4. _____ Appropriate Historic Background Research conducted
5. _____ Review of applicable Historic Contexts conducted
6. _____ Appropriate Archaeological Background Research conducted
7. _____ Existing information used to construct survey objectives and design - review of applicable historic contexts

D. SURVEY METHODOLOGY

1. _____ Reconnaissance Survey
_____ Intensive Survey (Secretary of Interior definition)
_____ or a combination of both types (provide percentages)
2. _____ Methods by which areas were searched clearly stated
3. _____ Areas surveyed clearly described
4. _____ If different areas searched by different methods, each sub-area clearly marked
_____ with boundaries specified
5. _____ Was sampling sufficient to satisfy management/compliance tasks
6. _____ Architectural/Historical
_____ Archaeological (HPF definition)
7. _____ Areas surveyed located the following maps:
_____ a. Map of the Western Pacific region
_____ b. Map of _____
_____ c. Vicinity map with lot numbers
_____ d. 1:24000 scale USGS map with boundaries of surveyed area clearly
_____ defined

E. PROPERTIES/SITES

1. _____ Kinds of properties/sites expected clearly stated
2. _____ Kinds and/or specific properties/sites searched for clearly stated
3. _____ Review of existing information and sources consulted listed and detailed
4. _____ Evaluated using historic contexts
5. _____ Properties/sites located on maps with boundaries clearly defined
6. _____ Clear indication of areas where historic properties do not occur
7. _____ Each property/site located and properly described on the Inventory Form
8. _____ Each property/site assigned a permanent site number
9. _____ Evaluated within applicable historic contexts

F. RECORDS/ARTIFACTS

1. _____ In addition, 2 Copies of the final report delivered to Micronesian Area Research
Center, the Nieves Flores Memorial Library and the CNMI HPO. Statement of this
distribution should be noted in the report.
2. _____ List of artifacts, other data and the identification of the permanent or temporary
repository for them clearly stated
3. _____ Submission of completed National Register Inventory forms

G. RESULTS

1. _____ Explanation of how objectives were met, not met, or partially met.
2. _____ If pre-survey expectations not confirmed, note and explanation of differences
3. _____ Explanation if any revisions or additions to the historic contexts are needed

H. RECOMMENDATIONS

1. _____ Recommendation(s) and their justification(s) clearly stated
2. _____ If further work recommended, the type and purpose for such work clearly stated
3. _____ Compliance procedure findings clearly established (eg., No properties, No effect, No adverse effect)

I. REVIEWERS COMMENTS/NOTES (Add sheets if necessary)

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook page or a sheet of stationery. There is no handwriting or other markings on the page.



**Department of Parks and Recreation
Dipattamenton Plaset Yan Dibuetsion**

Government of Guam

490 Chalan Palasyo

Agaña Heights, Guam 96910

Director's Office: (671) 475-6296/97; Fax (671) 477-0997

Parks Division: (671) 475-6288/89

Guam Historic Resources Division: (671) 475-6294/95/72; Fax (671) 477-2822

*Thomas A. Morrison
Director*

*Gregory A. Matanane
Deputy Director*

In reply refer to:
RC2005-536F

May 8, 2006

Marvin W. Smith Jr., Lt Col, USAF
Commander
36th Civil Engineer Squadron (PACAF)
Unit 14007
Department of the Air Force
APO AP 96543-4007

Subject: NHPA Section 106 Consultation
Review of Revised Research Design for the Proposed Cultural
Resources Inventories of Northwest Field and Aircraft Storage Areas
Andersen Air Force Base, Guam

Dear Commander Smith:

Thank you for submitting the revised Research Design for the above subject undertaking. It sufficiently addressed our major concerns outlined in our April 14, 2006 letter to Mr. Jonathan Wald. However, there are some minor corrections and clarifications that need to be addressed in the final design.

On page 7, fourth to the last line of the first paragraph it should read **post-contact** instead of **post-contract** Chamorro.

On page 8, first line under Research Questions, please clarify what is **lithic reduction loci**.

On page 10, Research Question:

(a), it states that residential sites are expected to cluster near the cliff edge while specialized extractive sites are expected to occur throughout the limestone forest. How or why did you arrived at this conclusion?

(b), regarding fossil freshwater sources. There are no fossil freshwater sources on Guam.

On page 12, question (b), lithic reduction stages are not usually applicable to Guam.

On page 20, under Human Remains, include State Historic Preservation Officer as one of the persons to be contacted. Also, prehistoric remains should be dealt with in accordance with our burial guidelines, which we can send you a copy upon request.

Page 2 of 2
RC2005-536
AAFB: CR Inventories

Please be aware that natives of Guam are called CHAMORROS, and non-natives as Guamanians - if they (non-natives) choose to be considered as such.

On page 22, under Results of Fieldwork, include all GPS locations.

Please note that the survey report will be reviewed against our Historic Properties Survey Report Evaluation Checklist.

Other than the above concerns, the Research Design as reviewed and commented here, is now sufficient.

If you have further questions please contact me, or Vic April, Territorial Archaeologist at 475-6294 / 6295/ or 6272.

Sincerely,


LYNDA BORDALLO AGUON
State Historic Preservation Officer

Cc: Dept. of Agriculture, DAWR
BSP, GCZM Program
Guam EPA



Dipattamenton Plaset Yan Dibuetsion
Government of Guam
490 Chalan Palasyo
Agana Heights, Guam 96910
Director's Office: (671) 475-6296/97; Fax (671) 477-0997
Parks Division: (671) 475-6288/89
Guam Historic Resources Division: (671) 475-6294/95/72;
Fax (671) 477-2822

Thomas A. Morrison
Director

Gregory A. Matanane
Deputy Director

In reply refer to:
RC2005-071F

October 3, 2006

Jonathan Wald, GS 12
Chief, Environmental Flight
Department of the Air Force
Headquarters, 36th Air Base Wing (PACAF)
Unit 14007, APO AP 96534-4007

Post-it* Fax Note 7671		Date	# of pages
To	Jonathan Wald	From	Lynda B. Aguon
Co./Dept.	Dept. of Air Force	Co.	DPR/6442D
Phone #	366-3550	Phone #	475-6294/5
Fax #	366-5088	Fax #	477-2822

Subject: Review and Comments, Executive Summary of Cultural Resources Inventory
for Establishment and Operation of an Intelligence, Surveillance, Reconnaissance,
and Strike Capability Andersen Air Force Base, Guam

Dear Mr. Wald:

We have reviewed the above subject document and have the following comments.

The eighteen (18) prehistoric and four (4) historic sites identified at the Intelligence, Surveillance, Reconnaissance and Strike Capability (ISR/Strike) site have been fully documented and evaluated as per the National Register criteria of eligibility.

The eighteen (18) prehistoric sites in which the mean artifact density range between one (1) item per two (2) square meters, and one (1) item per one hundred sixty nine (169) square meters are all pottery and artifact scatters. Of these eighteen (18) sites, the mean artifact diversity is about one (1) item per forty-two (42) square meters in an area with the depth of bedrock ranging between eight (8) and fifty six (56) centimeters throughout. Diagnostic artifacts representing each site have been documented and collected. Shovel tests that reached the bedrock between eight (8) and fifty (50) centimeters within the identified sites recorded minimal pottery and other artifacts.

Based on the above information, we agree that further archaeological investigation on prehistoric sites at ISR/Strike will not provide any new information about the project area, but such an investigation will only be redundant to what we already know about the project.

With regards to the site evaluation as per the National Register eligibility criteria, we agree that Site 66-08-2109 to Site 66-08-2127 do not meet the National Register criteria of eligibility and therefore no further management actions will be necessary.

Page 2

October 3, 2006

RC2005-071F

For Site 66-08-2124, concentration of historic bottles, Site 66-08-2128, rectangular concrete pad, Site 66-08-2129, Building 18020 built in 1959, and Site 66-08-2130, Building 1827 constructed in 1968, we agree that these have been fully documented and evaluated as not meeting the National Register eligibility criteria. Therefore, no further management actions will be required for them.

If you have further questions please call me, Vic April, State Archaeologist or Rich Olmo, Consultant Archaeologist, at 475-6294/6295 or 6272.

Sincerely,



LYNDA BORDAILLO AGUON
State Historic Preservation Officer



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 36TH WING (PACAF)
UNIT 14007, APO AP 96543-4007

10 Oct 2006

Ms. Lynda Bordallo Aguon
Guam State Historic Preservation Office
490 Chalan Palasyo
Agana Heights, GU 96910

Dear Ms. Aguon

This is in reply to RC2005-071F. Thank you for your letter dated 3 October 2006 and reviewing the Executive Summary of Cultural Resources Inventory for Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability at Andersen Air Force Base, Guam. The final report of the Research Design will be submitted to your office next month.

The Guam State Historic Preservation Office and Air Force agree the sites do not meet the National Register criteria of eligibility and require no further management actions. In compliance with Section 106 of the National Historic Preservation Act of 1966 and Protection of Historic and Cultural Properties as 36 CFR Part 800, the Air Force is formally ending the Section 106 consultation efforts between our respective offices.

It was a pleasure working closely with Vic April, State Archaeologist, and Rich Olmo, Consultant Archaeologist. For our upcoming projects, we look forward to coordinating with your office again.

Sincerely,

A handwritten signature in black ink, appearing to read "Jonathan Wald", is located below the "Sincerely," text.

JONATHAN WALD, GS-12
Chief, Natural and Cultural Resources

Executive Summary
Cultural Resources Inventory for
Establishment and Operation of an
Intelligence, Surveillance,
Reconnaissance, and Strike Capability
Andersen Air Force Base, Guam



Department of the Air Force
Pacific Air Forces
Hickam Air Force Base, Hawaii
August
2006



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1. INTRODUCTION

Geo-Marine, Inc., Las Vegas, Nevada, conducted a cultural resources inventory of approximately 210 acres on Andersen Air Force Base (AFB), Guam as a subcontractor to Parsons Engineering, Honolulu, Hawaii. The work was conducted under Subcontract No. 743189-30000-00 for Prime Contract No. F41624-63-8613. This inventory was required as part of an Environmental Impact Statement (EIS) for the proposed establishment of an Intelligence, Surveillance, Reconnaissance and Strike Capability (ISR/Strike) at Andersen AFB. The responsible agency for the undertaking is Department of the Air Force, Headquarters, Pacific Air Forces (PACAF), Hickam Air Force Base, Hawaii.

Andersen AFB is on northern Guam, largest and southernmost of the Mariana Islands, in the western Pacific Ocean (Figure 1.1). The 210-acre ISR/Strike study area is north-northwest of Andersen AFB Main and west of Pati Point (Figure 1.2) on an upland limestone plateau that supports a dense secondary growth limestone forest (Figure 1.3). Two aircraft hangars (Buildings 18020 and 18027), which may be impacted by planned activities for the development of ISR/Strike capabilities, are also included in this inventory. These are located south of the 210-acre survey area within the developed portion of Andersen AFB Main (Figures 1.2, 1.4).

Fieldwork began on 8 May 2006 and continued through 7 July 2006. Project Principal Investigator was Marcus P. Grant, Field Director was Erik Lash; archaeological crewmembers were Tyler Cremeens, Mara Durst, William Fallon, Norman Kitchen, and Richard Schaefer. Mikel Travisano was the project's Architectural Historian.

The purpose of this study was to fulfill Department of Defense (DoD) requirements to assess the impacts of any proposed undertaking on historic properties as directed by the National Environmental Policy Act (NEPA) of 1969 (PL 91-190) and Section 106 of the National Historic Preservation Act (NHPA), of 1966, as amended. The protection, compliance and stewardship roles of the Federal land managers, including the Air Force, in regard to historic preservation is also addressed in the Archeological Resources Protection Act (ARPA) of 1979. At Andersen AFB, oversight of NEPA, NHPA, ARPA, and other Federal environmental regulations and guidelines is the responsibility of 36th Civil Engineer Squadron/Environmental Flight (36 CES/CEV). An Integrated Cultural Resource Management Plan (ICRMP) provides specific guidelines for the discovery, documentation, and treatment of historic properties on Andersen AFB (IARII 2003).

The inventory identified 18 prehistoric sites, two historic archaeological sites, two historic architectural sites (Buildings 18020 and 18027), and 13 prehistoric isolates. The prehistoric and historic sites were evaluated against National Register of Historic Places (NRHP) eligibility criteria under 36 CFR 60.4. None are recommended for NRHP inclusion. Buildings 18020 and 18027, representative of Luria Engineering design and maintained and used as hangars during the Cold War, lack exceptional significance under Criterion Consideration G for buildings less than 50 years of age. Therefore, neither building is considered eligible for inclusion on the NRHP. Detailed site summaries and

rationale for NRHP assessments are provided in following sections. Isolates, by their nature, are not considered eligible for NRHP listing. Since no significant historic properties will be impacted, a determination of no effect is recommended for the proposed undertaking.



Figure 1.1. Island of Guam and surrounding area (inset).

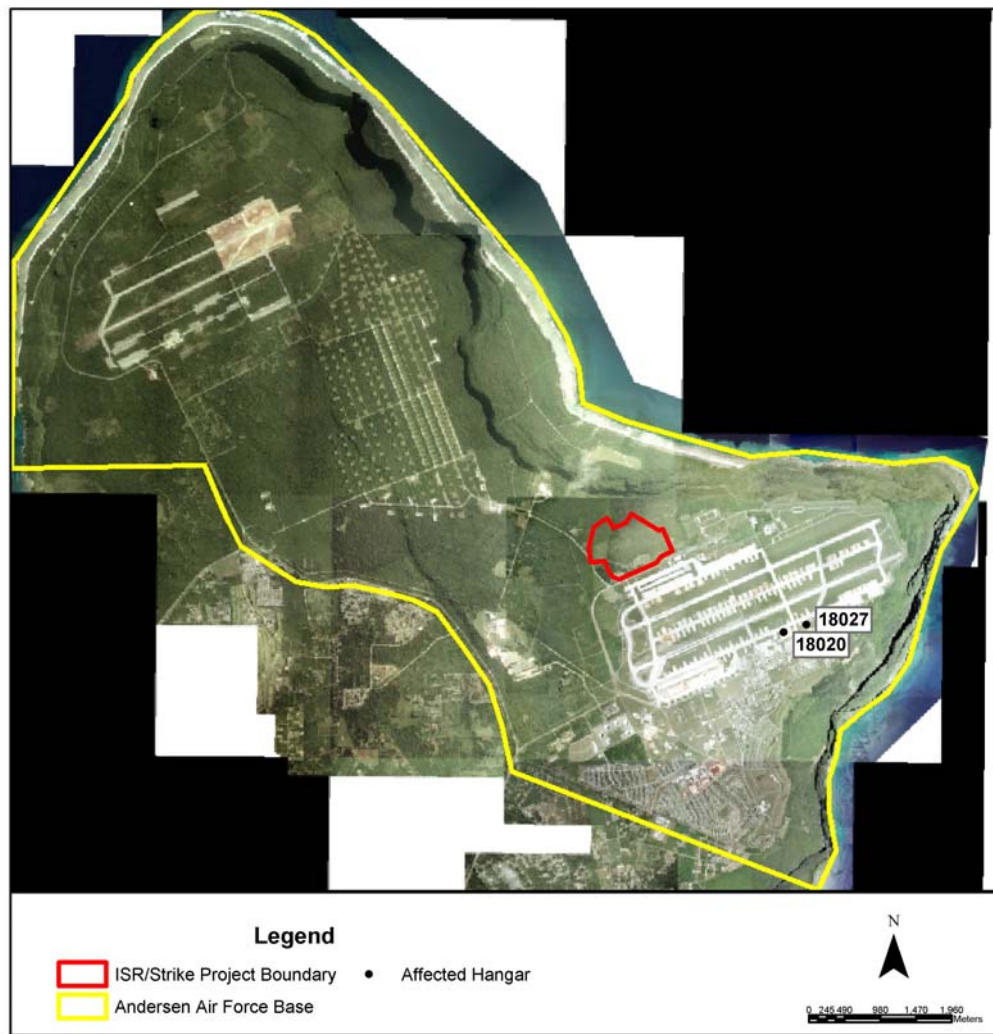


Figure 1.2. Aerial mosaic image of a portion of northern Guam showing Andersen AFB and the 210-acre ISR/Strike survey area boundaries.



Figure 1.3. Secondary growth limestone forest typical of the project area.



Figure 1.4. Aerial view of a portion of Andersen AFB showing Buildings 18020 and 18027.

2. Methods

A revised research design for this project was submitted to 36 CES/CEV and Guam Historic Preservation Office (GHPO) in May 2006 and approved by both agencies. The research design is attached as Appendix VI. Field and laboratory methods for this project followed those outlined in the research design.

Because of dense vegetation, prehistoric site boundary definition was a multi-stage process. The survey crew cut one-meter-wide transects through the vegetation at 10-meter intervals, navigating with both compasses and hand-held GPS receivers. All surface artifacts or artifact concentrations were mapped using a Trimble Geo-XM or Geo XT GPS receiver and assigned a temporary number. Upon completion of all survey transects, the crew returned to these mapped loci and systematically cleared vegetation, shovel probed, and mapped any additional cultural material found on newly cleared surfaces.

Using a criterion of at least 30 m between surface artifacts or culturally positive shovel probes to define site boundaries, multiple loci were often combined into a single site during this process or later, during the compilation of map data in the office. Loci that contained five or fewer ceramic sherds or single occurrences of other artifact types associated with negative shovel tests and located 30 m or more from other artifacts or positive shovel tests were noted as isolates.

Relative dates of prehistoric sites are assigned based on ceramic typology. Although a variety of ceramic types are identified in the Mariana Islands (Moore 2002), the salient diagnostic traits for this project are Type A (thin) and Type B (thickened) rim sherds. Type B rims are indicative of the Latte Period, which extends from approximately A.D. 1000 to A.D. 1620 (Hunter-Anderson and Butler 1995:25-27) and are one of the traits that differentiate ceramic assemblages of this period from those of the earlier Unai Phase.

The transition to Type B rims occurred gradually, however, along with other technological changes, during a Transitional Period, sometimes designated Huyong Phase, from approximately A.D. 400-1,000 (Moore 2000). Type A rims, by themselves, are not necessarily indicative of earlier occupations as they continue to occur in Latte Period assemblages in relatively small proportions. Detailed data on ceramic traits, as well as other artifact types, are included in the following section.

3. RESULTS

3.1 Overview

Archaeological sites recorded in the overall project area represent three broad categories: 1) prehistoric sites 2) historic non-architectural sites, and 3) historic architectural sites. As noted in the Introduction, historic architectural sites are confined to the main base area, which is not contiguous with the 210-acre ISR/Strike cultural resources survey area. Site numbers, temporary numbers, site types, and estimated or known date ranges are summarized in Table 3.1.

Table 3.1. Summary of prehistoric and historic sites.

Site No.	Temp. No.	Site Type	Time Period
66-08-2109	ASA-1	Ceramic scatter	c. AD 1000 to 1620
66-08-2110	ASA-2	Artifact scatter	c. AD 1000 to 1620
66-08-2111	ASA-5	Artifact scatter	c. AD 1000 to 1620
66-08-2112	ASA-8	Ceramic scatter	c. AD 1000 to 1620
66-08-2113	ASA-11	Artifact scatter	c. AD 1000 to 1620
66-08-2114	ASA-15	Ceramic scatter	c. AD 1000 to 1620
66-08-2115	ASA-26	Ceramic scatter	c. AD 1000 to 1620
66-08-2116	ASA-27	Ceramic scatter	c. AD 1000 to 1620
66-08-2117	ASA-28	Artifact scatter	c. AD 1000 to 1620
66-08-2118	ASA-32	Artifact scatter	c. AD 1000 to 1620
66-08-2119	ASA-36	Artifact scatter	c. AD 1000 to 1620
66-08-2120	ASA-39	Ceramic scatter	c. AD 1000 to 1620
66-08-2121	ASA-41	Artifact scatter	c. AD 1000 to 1620
66-08-2122	ASA-44	Artifact scatter	c. AD 1000 to 1620
66-08-2123	ASA-45	Ceramic scatter	c. AD 1000 to 1620
66-08-2124	ASA-47	Bottle dump	c. AD 1945-1953
66-08-2125	ASA-49	Ceramic scatter	c. AD 1000 to 1620
66-08-2126	ASA-50	Ceramic scatter	c. AD 1000 to 1620
66-08-2127	ASA-55	Artifact scatter	c. AD 1000 to 1620
66-08-2128	ASA-56	Concrete pad	AD 1945
66-08-2129	Bldg 18020	Aircraft hangar	AD 1959 onward
66-18-2130	Bldg 18027	Aircraft hangar	AD 1968 onward

Ceramic sherds are the most common prehistoric artifacts recovered in the project area, totaling 1, 057. Of these, 622 (59 percent) were noted on the present ground surface; the balance (435 or 41 percent) was recovered from subsurface contexts within 50 x 50 cm shovel tests. The majority of sherds (1,042) occurred on sites; 15 occurred in isolated contexts.

Body sherds outnumber rim sherds by a ratio of more than 5:1. Based on a total of 870 sherds recorded on sites and for which metric data are available (dimensions were not recorded for five uncollected body sherds). These sherds range in thickness from 0.40 to 2.35 cm with a mean of 0.975 cm. Analysis of variance (ANOVA) indicates no

difference in mean sherd thickness across sites ($F [868] = 0.998, p = 0.495$). The sample of body sherds is apparently drawn from a single population, such that variation in thickness gives no indication of temporal or functional differences among sites in the study area.

Typical of Latte Period ceramic assemblages, in which the majority of vessels exhibit thickened (Type B) rims (Moore 2002), the current sample is characterized by rim sherds that are significantly thicker, on average, than body sherds ($t [202.819; \text{equal variances not assumed}] = -21.020, p < 0.0001$). The mean thickness of rim sherds is 1.68 cm, with a maximum of 3.86 cm. Type B rim sherds (Figure 3.2) comprise 98 percent ($n = 163$) of the rim sherd sample. Four items recorded as Type A rims, which occur on two sites, range in thickness from 0.55 to 1.03 cm. Figure 3.1 illustrates differences in the mean thickness of both types of rims and body sherds in the current sample.

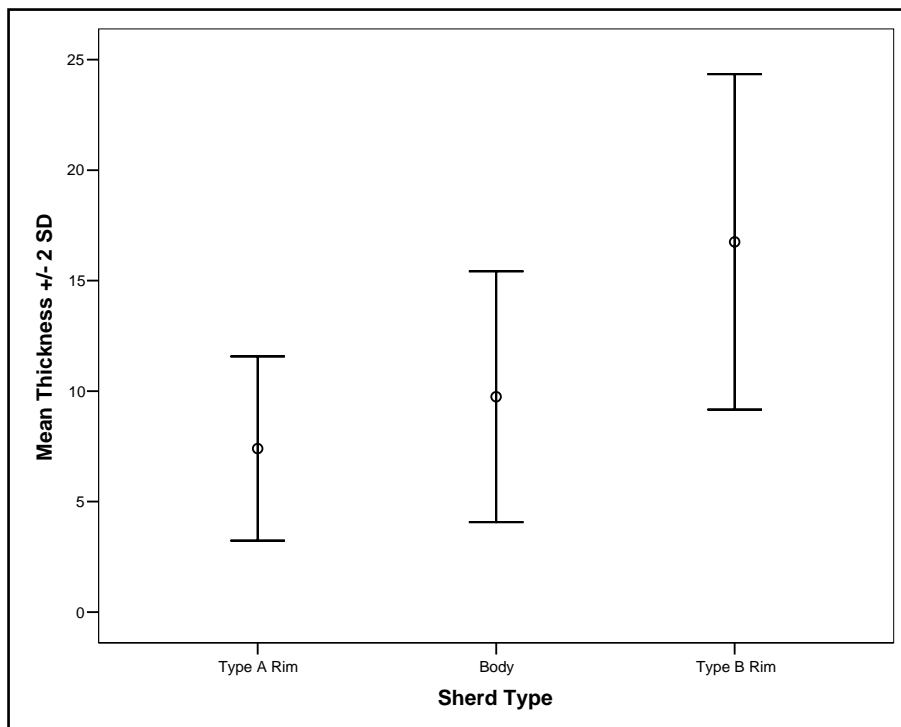


Figure 3.1. Mean ceramic sherd thickness in millimeters, bracketed by two standard deviations, for Type A rims, body sherds, and Type B rims in the current sample.

Additional artifact types recorded on prehistoric sites include 22 ground stone items, such as abraders, adzes, a chisel, a pestle (Figure 3.3) and unidentifiable fragments; 21 shell specimens (five adzes [Figure 3.4] and 16 unaltered or minimally altered fragments of marine bivalves or gastropods); two basalt cores and two basalt primary flakes, and four sling stones (Figure 3.5). Historic artifacts are limited to bottles, which occur on one site believed to have accumulated between c. 1945 and 1953.



Figure 3.2. Type B (thickened) rim sherd with smooth exterior surface typical of those in the current sample.

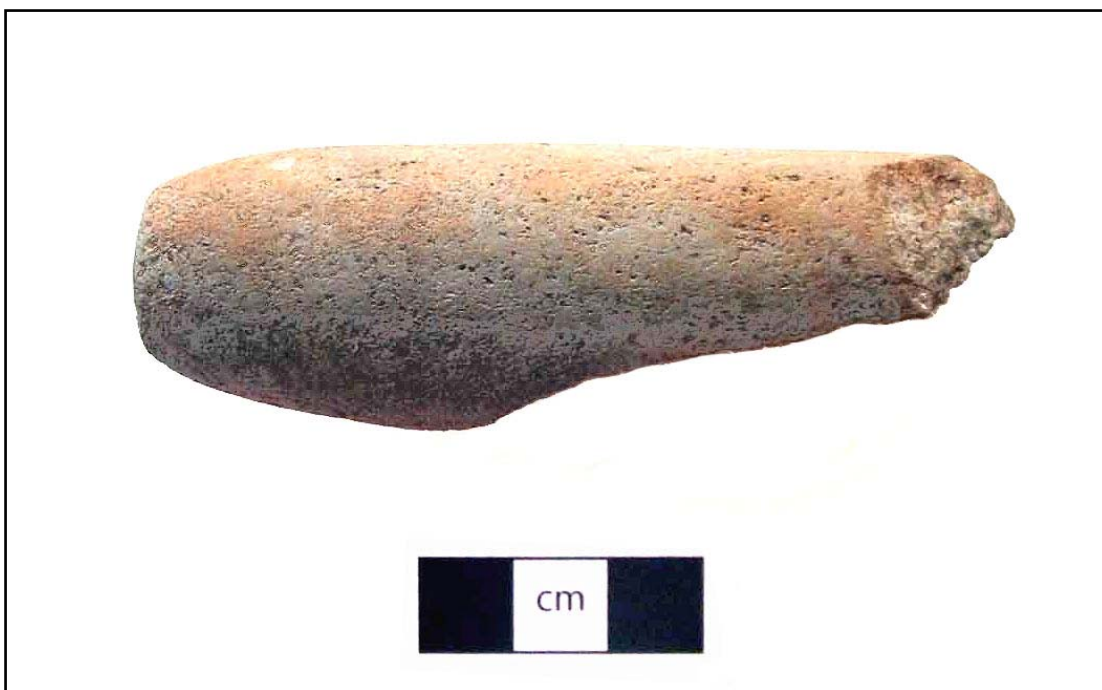


Figure 3.3. Incomplete basalt pestle, FS 145, Site 66-08-1227.



Figure 3.4. Tridacna shell adze (dorsal surface), FS 2, Site 66-08-2119.

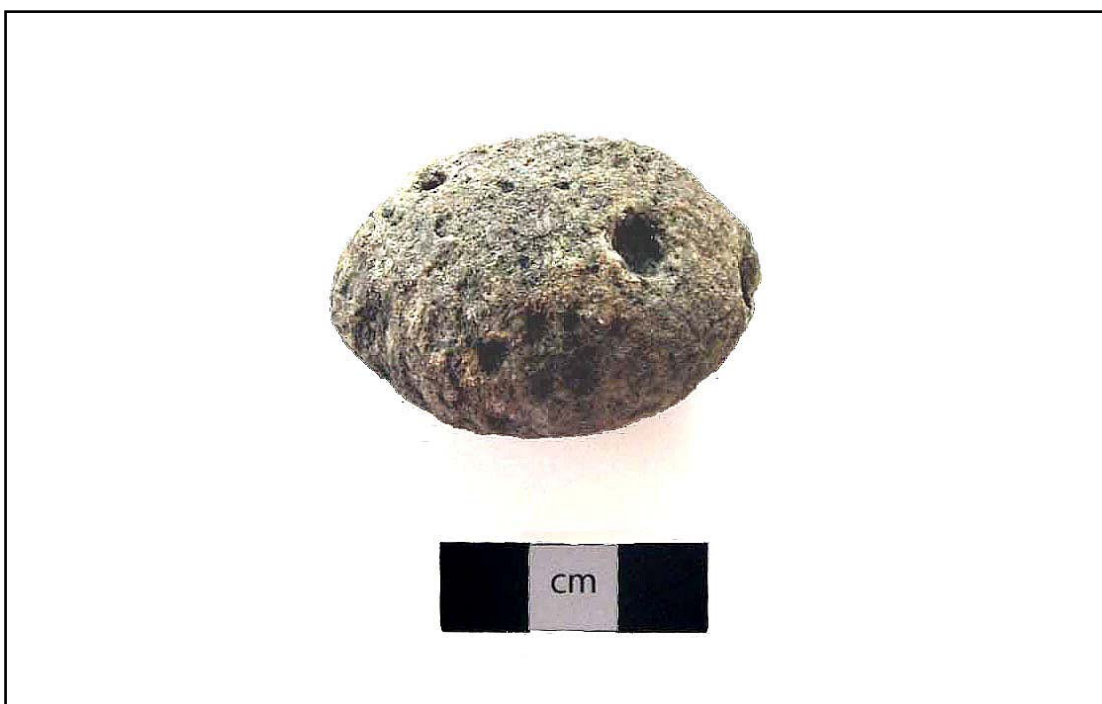


Figure 3.5. Abraded coral sling stone, FS 9, Site 66-08-2123.

3.2 Prehistoric Sites

3.2.1 Site 66-08-2109 (Temp. No. ASA-1)

Description

This site is a ceramic scatter that encompasses approximately 626 m² (0.15 acre) in moderately dense secondary-growth limestone forest that borders an area of historic disturbance. The site consists of 42 ceramic sherds, 17 of which were recovered from shovel tests. Mean sherd density is about one item per 15 m². Nine shovel test probes (STP) were excavated to bedrock. Soil onsite is a single stratum of sandy clay loam that ranges from 12 to 25 cm in depth.

All of the ceramic sherds exhibit smooth interior and exterior surfaces and volcanic sand temper. The site assemblage includes seven rim sherds, all classified as Type B. The body sherds range in thickness from 0.47 to 1.28 cm with a mean of 0.94 cm. Rim sherds on this site range in thickness from 1.38 to 1.80 cm with a mean of 1.57 cm. These ranges and means are typical of the project ceramic sample as a whole, as is the ratio of body sherds to rim sherds (6:1).

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The artifact assemblage provides no clues as to what was being collected and/or processed onsite. The plain, volcanic sand-tempered ceramics with thickened rims indicate occupation during the Latte period.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.2.2 Site 66-08-2110 (Temp. No. ASA-2)

Description

This site is an artifact scatter that encompasses approximately 1,156 m² (0.28 acre) in moderately dense secondary-growth limestone forest. The site consists of 42 ceramic sherds and one basalt adze fragment. Seventeen ceramic sherds and the adze were recovered from shovel tests. Mean sherd density is about one item per 28 m².

Eleven 50 x 50 cm STPs were excavated to bedrock. Soils onsite were somewhat varied. All STPs encountered silty clays or silty clay loams as the uppermost stratum. A lower stratum of silty clay loam was observed in two STPs. The depth of bedrock onsite ranged from 3 to 28 cm with an average depth of 17 cm. Artifacts were recovered from 6 of the 11 STPs. The majority of positive shovel tests (5 or 83 percent) contained artifacts in the upper 17 cm of excavation. Ceramic artifacts were recovered to a maximum depth of approximately 27 cm in five STPs.

The majority of ceramic sherds onsite exhibit smooth exterior (27 or 64 percent) and smooth interior (37 or 88 percent) surfaces. A scraped exterior surface is noted on one sherd. The balance of sherds (13) could not be further specified due to exfoliation. The site assemblage includes eight rim sherds, three of which were recovered from STPs. Seven rim sherds are classified as Type B and one as Type A. The body sherds range in thickness from 0.41 to 1.89 cm with a mean of 1.01 cm. Rim sherds on this site range in thickness from 1.03 to 1.94 cm with a mean of 1.64 cm. These ranges and means are typical of the project ceramic sample as a whole, as is the ratio of body sherds to rim sherds (4:1). The adze fragment (FS 33) measures 3.14 x 2.08 x 0.84 cm.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The artifact assemblage provides no clues as to what was being collected and/or processed onsite, though the presence of a basalt adze fragment suggests woodworking onsite. The plain ceramics with thickened rims indicate occupation during the Latte period. The presence of a single Type A rim is not necessarily indicative of an earlier component, as a small percentage of Type A rims often occur in Latte period assemblages.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.2.3 Site 66-08-2111 (Temp. No. ASA-5)

Description

This site is a ceramic scatter that encompasses approximately 45 m² (0.01 acre) in moderately dense secondary-growth limestone forest. The site consists of 12 ceramic sherds, six of which were recovered from shovel tests. Mean artifact density is extremely low, approximately one item per 4 m².

Two 50 x 50 cm shovel test probes were excavated to bedrock. Soil onsite is a silty clay loam with gravel inclusions. Shovel Test Probe 2 encountered a dip in the limestone

bedrock and extended to 73 cm, the deepest shovel test in the project area. From 18 cm onward this STP contained a second stratum of slightly darker and less gravelly soil of the same texture. Ceramic sherds were recovered from Strata I and II of both STPs to a maximum depth of 73 cm.

All of the ceramic sherds exhibit smooth or unspecified interior and exterior surface treatments. Temper is undetermined. The site assemblage includes two thickened Type B rim sherds. The body sherds range in thickness from 0.77 to 1.34 cm with a mean of 1.05 cm. Rim sherds on this site range in thickness from 1.32 to 1.75 cm. These ranges and means are typical of the project ceramic sample as a whole, as is the ratio of body sherds to rim sherds (6:1).

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The low sherd count and absence of other artifacts suggest this site may alternatively represent an incidental a pot break, possibly associated with a travel route between sites. The artifact assemblage provides no clues as to what was being collected or processed onsite. The plain ceramic sherds with thickened rims indicate occupation during the Latte period.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.2.4 Site 66-08-2112 (Temp. No. ASA-8)

Description

This site is a ceramic scatter that encompasses approximately 287 m² (0.07 acre) in moderately dense secondary-growth limestone forest. The site consists of 18 ceramic sherds, sixteen of which were recovered from shovel tests. Mean sherd density is about one item per 16 m².

Two 50 x 50 cm STPs were excavated to bedrock. STP 1 encountered two strata of silty clay loam differentiated by color; STP 2 contained a single stratum of sandy clay loam. The depth of bedrock onsite ranged from 13 to 36 cm. Ceramic sherds were recovered from both STPs to a maximum depth of approximately 36 cm.

Most ceramic sherds onsite exhibit smooth exterior (15 or 83 percent) and smooth interior (15 or 83 percent) surfaces. One sherd exhibits a scraped exterior. The balance of sherds (2) could not be further specified due to exfoliation. The site assemblage includes

five rim sherds, four recovered from STPs. Two rim sherds are classified as Type B and three as Type A. The body sherds range in thickness from 0.55 to 1.58 cm with a mean of .91 cm. Rim sherds on this site range in thickness from .55 to 1.5 cm with a mean of .94 cm. The mean thickness of body sherds on this site is representative of the overall sample. The thickness of rim sherds, however, is below the 5th percentile range for the complete project sample (on average, over 95 percent of rim sherds in the project area are thicker). A 2.6:1 ratio of body sherds to rim sherds is also unusual.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The low sherd count and absence of other artifacts suggest this site may alternatively represent an incidental pot break, possibly associated with a travel route between sites. The artifact assemblage provides no clues as to what was being collected and/or processed onsite. The plain ceramics with thickened and non-thickened rims indicate probable occupation during the Latte period. The overall proportion of non-thickened Type A rims in the project area is two percent. Although this site contains a larger proportion of Type A rims and significantly lower mean rim thickness than noted on other sites, the small sample size precludes any conclusion that this site represents an earlier temporal component.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.5 Site 66-08-2113 (Temp. No. ASA-11)

Description

This site is an artifact scatter that encompasses approximately 4,910 m² (1.21 acres) in dense secondary-growth limestone forest. The site consists of 75 ceramic sherds, 47 of which were recovered from shovel tests, and one possible limestone abrader fragment. Mean artifact density is extremely low, approximately one item per 65 m², though clusters occur throughout the site.

Twenty-one 50 x 50 cm STPs were excavated to bedrock. Soils onsite were somewhat varied. Most STPs encountered silty clays or silty clay loams. Localized areas of loam and silt-loam topsoils were also noted. The depth of bedrock onsite ranged from 18 to 49 cm with an average depth of 30 cm. Ceramic sherds were recovered from 13 of the 21 STPs. The majority of positive shovel tests (9 or 69 percent) contained artifacts in the upper 20 cm of excavation. Ceramic artifacts were recovered from both strata to a maximum depth of 49 cm in one STP.

The majority (55 or 73 percent) of ceramic sherds onsite exhibit smooth exterior surfaces. Combed exterior surfaces are noted on 5 (seven percent) sherds; one scraped exterior surface is also noted. Combed sherds occur in the surface collection and from STPs and represent both body sherds and Type B rims. The balance of sherds (14) could not be further specified due to exfoliation. The site assemblage includes two thickened Type B rim sherds. The body sherds range in thickness from 0.77 to 1.34 cm with a mean of 1.05 cm. Rim sherds on this site range in thickness from 1.32 to 1.75 cm. These ranges and means are typical of the project ceramic sample as a whole, as is the ratio of body sherds to rim sherds (6:1). The abrader fragment measures 10.4 x 8.62 x 6.83 cm.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The artifact assemblage provides no clues as to what was being collected or processed onsite, though the presence of a possible abrader fragment suggests wooden tool manufacture in addition to collection or storage of food resources. The plain ceramic sherds with thickened rims indicate occupation during the Latte period.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.2.6 Site 66-08-2114 (Temp. No. ASA-15)

Description

This site is a ceramic scatter that encompasses approximately 25 m² in dense secondary-growth limestone forest. The site consists of 11 ceramic sherds, two of which were recovered from shovel tests. Mean artifact density is approximately one item per 2 m².

A single 50 x 50 cm STP was excavated to bedrock. Soil onsite was a single stratum of silty clay loam with frequent gravel inclusions. Bedrock was encountered at 28 cm. Two ceramic sherds were recovered from the upper 10 cm of excavation.

The majority (10 or 91 percent) of ceramic sherds onsite exhibit smooth exterior surfaces. A single body sherd with a partially combed surface is noted. All interior sherd surfaces are smooth. Body sherds (n = 9) range in thickness from 0.80 to 1.18 cm with a mean of 0.94 cm. Two rim sherds, both recorded as Type B, were recovered. These range in thickness from 1.36 to 1.64 cm. These ranges and means are typical of the project ceramic sample as a whole, as is the ratio of body sherds to rim sherds (5.5:1).

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The low sherd count and absence of other artifacts suggest this site may alternatively represent an incidental pot break, possibly associated with a travel route between sites. The artifact assemblage provides no clues as to what was being collected or processed onsite. The plain ceramic sherds with thickened rims indicate occupation during the Latte period.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.2.7 Site 66-08-2115 (Temp. No. ASA-26)

Description

This site is a ceramic scatter that encompasses approximately 502 m² (0.12 acre) in moderately dense secondary-growth limestone forest. The site consists of 16 ceramic sherds, five of which were recovered from shovel tests. Mean sherd density is low, about one item per 31 m².

Ten 50 x 50 cm STPs were excavated to bedrock. All STPs encountered silty clays or silty clay loams. The depth of bedrock onsite ranged from nine to 32 cm with an average depth of 19 cm. Ceramic sherds were recovered from two of the 10 STPs in the upper 23 cm of excavation.

All ceramic sherds onsite exhibit smooth exterior surfaces and the majority exhibits smooth (14 or 87%) interior surfaces. Two sherds have indeterminate interior surface treatments due to exfoliation. The site assemblage includes two rim sherds classified as Type B. The body sherds range in thickness from 0.78 to 1.59 cm with a mean of 1.06 cm. Rim sherds on this site range in thickness from 1.26 to 1.6 cm with a mean of 1.43 cm. These ranges and means are typical of the project ceramic sample as a whole; the ratio of body sherds to rim sherds (7:1) is somewhat higher than usual.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The low sherd count and absence of other artifacts suggest this site may alternatively represent an incidental pot break, possibly associated with a travel route between sites.

The artifact assemblage provides no clues as to what was being collected and/or processed onsite. The plain ceramics with smooth exteriors and thickened rims indicate occupation during the Latte period.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.8 Site 66-08-2116 (Temp. No. ASA-27)

Description

This site is a ceramic scatter that encompasses approximately 25 m² in dense secondary-growth limestone forest. The site consists of 8 ceramic body sherds, six of which were recovered from a shovel test. Mean artifact density is approximately one item per 3 m², though obviously the majority of sherds on this site occurred within an area less than one meter in diameter.

A single 50 x 50 cm STP was excavated to bedrock. Soil onsite was a sandy clay loam that formed two strata based on color differences. Bedrock was encountered at 18 cm. Stratum 1, which extended to 11 cm, contained six ceramic sherds.

The majority (7 or 88 percent) of ceramic sherds onsite exhibit smooth exterior surfaces. A single sherd with a combed surface is noted. All interior sherd surfaces are smooth or undetermined due to exfoliation. The body sherds range in thickness from 0.49 to 1.29 cm with a mean of 0.71 cm. This is a broader range and a lower mean value than is typical of the overall sample, but this is probably a function of the small sample size.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The low sherd count and absence of other artifacts suggest this site may alternatively represent an incidental pot break, possibly associated with a travel route between sites. The absence of rim sherds makes the site's temporal affinity uncertain; however, the presence of both smooth and combed sherds, and the context of nearby sites, suggests affiliation with the Latte Period.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.9 Site 66-08-2117 (Temp. No. ASA-28)

Description

This site is an artifact scatter that encompasses approximately 10,106 m² (2.49 acres) in moderately dense secondary-growth limestone forest. The site consists of 88 ceramic sherds, seven ground stone specimens, four lithic artifacts, and sixteen shell specimens. Mean artifact density is extremely low, about one item per 87 m², though significant clusters occur in the western site area.

Twenty-nine 50 x 50 cm STPs were excavated to bedrock. Soils onsite were somewhat varied. Most STPs encountered silty clay loams. Localized areas of silty clay, silt loam, and sandy clay loam topsoil were also noted. The depth of bedrock onsite ranged from 8 to 50 cm with an average depth of 23 cm. Twenty-three ceramic sherds were recovered from 9 of the 29 STPs; no other artifact types were encountered in the shovel probes. The majority of positive shovel tests (7 or 77 percent) contained ceramic sherds in the upper 20 cm of excavation. Three STPs contained sherds in both strata and extended to a maximum depth of approximately 35 cm.

The majority (67 or 76 percent) of ceramic sherds onsite exhibit smooth exterior surfaces. Combed exterior surfaces are noted on 7 (eight percent) sherds; one scraped exterior surface is also noted. Combed sherds occur in the surface collection and from STPs and represent both body sherds and Type B rims. The balance of sherds (13) could not be further specified due to exfoliation. Smooth interior surfaces are noted on 77 (87 percent) sherds; 11 cannot be further specified due to exfoliation. The site assemblage includes ten rim sherds classified as Type B.

The body sherds range in thickness from 0.49 to 1.95 cm with a mean of .97 cm. Rim sherds on this site range in thickness from 1.4 to 3.86 cm with a mean of 1.89 cm. The ranges and means of body sherds are typical of the project ceramic sample as a whole. A single Type B rim sherd with a thickness of 3.86 cm on this site is a statistical outlier and is disproportionately influencing the mean thickness of rim sherds onsite, which is in the 89th percentile range for the overall rim sherd sample (on average, 89 percent of rim sherds will be thinner than this mean). The other rim sherds onsite are within typical ranges for the broader project sample. The ratio of body sherds to rim sherds (6:1) is also representative of the overall sample.

The seven ground stone specimens include three possible limestone abrader fragments (FS 5, 10, and 40), one basalt metate fragment (FS 34), one basalt abrader fragment (FS 6), and two ground basalt fragments (FS 77, 102) that could not be further classified. The lithic artifacts onsite are one incomplete unidirectional basalt core (FS 99), one incomplete randomly flaked basalt core (FS 101), and two basalt primary flakes.

Two abraded *Tridacna* shell adzes (FS 9 and FS 13) were recorded also. FS 13 is complete and measures 7.1 x 3.7 x 1.02 cm; FS 9 is fragmentary. Additionally, 14

unaltered marine shell fragments were noted: five unidentified bivalves, 6 unidentified gastropods, 1 Tridacna shell, and two small fragments that could not be further classified.

Interpretation and Recommendation

This site is interpreted as a briefly occupied but fairly diverse resource collection, processing, and tool manufacturing locus. The artifact assemblage indicates collection, storage, or cooking of foods or water storage in ceramic vessels, grinding of plant foods and/or other materials, woodworking, lithic tool manufacture, and possible shell tool manufacture. The plain ceramics with thickened rims indicate occupation during the Latte period.

Although this site represents a broader range of activities than most sites in the study area, the low density of artifacts, as well as an absence of cultural features and temporally or functionally divergent cultural strata, suggest the site's research potential is limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.10 Site 66-08-2118 (Temp. No. ASA-32)

Description

This site is an artifact scatter that encompasses approximately 6,191 m² (1.53 acres) in moderately dense secondary-growth limestone forest. The site consists of 115 ceramic sherds, one ground stone specimen and one shell adze. Twenty-eight ceramic sherds and the shell adze were recovered from shovel tests. Mean sherd density is extremely low, about one item per 53 m², though two significant clusters occur in the northern site area.

Nineteen 50 x 50 cm STPs were excavated to bedrock. Soils onsite were somewhat varied. Most STPs encountered silty clay loams. Two STPs contained a second stratum of silt loam and one STP contained a second stratum of sandy clay loam. The depth of bedrock onsite ranged from 10 to 56 cm with an average of 24 cm. Artifacts were recovered from 11 of the 19 STPs. The majority of positive shovel tests (9 or 81 percent) contained artifacts in the upper 20 cm of excavation. Ceramic artifacts were recovered to a maximum depth of approximately 50 cm in one STP. The shell adze was recovered from a depth of approximately 19 cm.

The majority (102 or 87 percent) of ceramic sherds onsite exhibit smooth exterior surfaces. Combed exterior surfaces are noted on 3 (two percent) sherds; one scraped and one incised exterior surfaces are also noted. The balance of sherds (8) could not be further specified due to exfoliation. Smooth interior surfaces are noted on 102 (87 percent) ceramic sherds; two sherds are scraped on the interior and ten could not be further specified due to exfoliation. The ceramic assemblage includes twenty-three rim

sherds classified as Type B; three recovered from STPs. The body sherds range in thickness from 0.4 to 1.9 cm with a mean of 1.03 cm. Rim sherds on this site range in thickness from 1.08 to 2.04 cm with a mean of 1.6 cm. These ranges and means are typical of the project ceramic sample as a whole, as is the ratio of body sherds to rim sherds (4:1).

The basalt ground stone specimen (FS 50) is a fragmentary cobble with ground surfaces and edges that could not be further classified. It measures 6.1 x 4.0 x 1.2 cm. The adze fragment (FS 117), which is heavily weathered, is manufactured from abraded *Tridacna* shell. All intact edges exhibit wear. The specimen measures 3.2 x 3.3 x 0.41 cm.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The artifact assemblage suggests some diversity of activities onsite including woodworking and grinding of plant foods or other materials. The plain ceramics with predominately smooth surfaces and thickened rims indicate occupation during the Latte period.

Although a range of activities is indicated, the low density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, suggest the site's research potential is limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.11 Site 66-08-2119 (Temp. No. ASA-36)

Description

This site is an artifact scatter that encompasses approximately 597 m² (0.14 acre) in moderately dense secondary-growth limestone forest. The site consists of 18 ceramic sherds, two ground stone specimens and one complete *Tridacna* shell adze. Eight ceramic sherds were recovered from shovel tests. Mean sherd density is about one item per 28 m².

Twelve 50 x 50 cm STPs were excavated to bedrock. Soils onsite were somewhat varied. Most STPs encountered silty clay loams. Localized areas of silty clay, loam, and sandy clay loam topsoils were also noted. The depth of bedrock onsite ranged from 12 to 26 cm with an average of 16 cm. Ceramic sherds were recovered from 2 of the 12 STPs. All positive shovel tests contained artifacts in the upper 20 cm of excavation.

Eight ceramic sherds onsite exhibit smooth exterior surfaces; combed exterior surfaces are noted on five sherds and two sherds exhibit scraped exterior surfaces. The balance of sherds (3) could not be further specified due to exfoliation. All combed sherds are body sherds and were recovered from STPs. The majority (16 or 88 percent) of ceramic sherds

onsite exhibit smooth interior surfaces. Two sherds could not be further specified due to exfoliation. The site assemblage includes three rim sherds classified as Type B. The body sherds range in thickness from 0.8 to 1.8 cm with a mean of 1.2 cm. Rim sherds on this site range in thickness from 1.2 to 2.2 cm with a mean of 1.8 cm. These ranges and means are typical of the project ceramic sample as a whole, as is the ratio of body sherds to rim sherds (5:1).

The ground stone specimens are incomplete with ground surfaces and unmodified edges; FS 10 is a basalt metate fragment; FS 11 could not be further classified. These measure 10.6 x 9.8 x 5.05 cm and 9.4 x 4.7 x 2.6 cm, respectively. The Tridacna shell adze (FS 2) is abraded on both surfaces and along the edges. The specimen is complete and measures 7.5 x 41.3 x 0.95 cm.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The artifact assemblage suggests some diversity of activities onsite including woodworking and grinding of plant foods or other materials. The plain ceramics with predominately smooth surfaces and thickened rims indicate occupation during the Latte period.

Although a range of activities is indicated, the low density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.12 Site 66-08-2120 (Temp. No. ASA-39)

Description

This site is a ceramic scatter that encompasses approximately 25 m² in dense secondary-growth limestone forest. The site consists of 8 ceramic sherds, six of which were recovered from a shovel test. Mean artifact density is approximately one item per 3 m², though obviously the majority of sherds on this site occurred within an area less than one meter in diameter.

A single 50 x 50 cm STP was excavated to bedrock. Soil onsite was silty clay that formed two strata based on color differences. Bottom depth of the STP was not recorded; Stratum 1 is noted as extending to 18 cm. Ceramic sherds were recovered from both strata.

The majority (6 or 75 percent) of ceramic sherds onsite exhibit smooth exterior surfaces. A single sherd with a combed surface is noted, and one sherd's exterior treatment is undetermined due to surface exfoliation. All interior sherd surfaces are smooth. The body sherds range in thickness from 0.70 to 1.21 cm with a mean of 0.91 cm. A single 1.59

cm-thick Type B rim sherd was recovered. These dimensions are typical of the project sample as a whole. Calcareous and undetermined tempers are noted.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The low sherd count and absence of other artifacts suggest this site may alternatively represent an incidental a pot break, possibly associated with a travel route between sites. The plain sherds with smooth or combed exteriors and the presence of a thickened rim indicate temporal affinity with the Latte Period.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.13 Site 66-08-2121 (Temp. No. ASA-41)

Description

This site is an artifact scatter that encompasses approximately 1,812 m² (0.44 acre) in dense secondary-growth limestone forest. The site consists of 71 ceramic sherds and a fragment of unaltered marine shell. Over half of the ceramic sherds (36) were recovered from shovel tests; the shell fragment occurred on the site surface. Mean artifact density is about one item per 24 m², though a significant artifact cluster occurs in the south-central site area.

Eleven 50 x 50 cm STPs were excavated to bedrock. Soils onsite were gravelly to stony silt loams and silty clay loams. Sediment depth varied from 16 to 29 cm with a mean of 21 cm. A second stratum, indicated by a change in soil color or texture, was noted in six STPs. Ceramic sherds were recovered from six STPs at depths ranging from 10 to 26 cm. All ceramics were recovered from Stratum 1.

The majority (45 or 63 percent) of ceramic sherds onsite exhibit smooth exterior surfaces. Combed exterior surfaces are noted on 13 sherds (18 percent), three (4 percent) are scraped, and the remainder (10 or 14 percent) is undetermined due to surface exfoliation. Smooth interior surfaces are noted for 91 percent (n = 64) of the assemblage. Possible cord marking is noted on the interior surface of a single sherd; six interior surface treatments are undetermined due to exfoliation. All of the specimens with combed or scraped exterior surfaces were recovered from STPs while the majority of items with smooth exterior surfaces were recovered from the site surface.

Body sherds (n = 65) range in thickness from 0.44 to 1.78 cm with a mean of 0.99 cm. Six rim sherds onsite, all noted as Type B, range from 1.28 to 2.71 cm in thickness with a mean of 1.80 cm. These dimensions are somewhat remarkable. The maximum body sherd thickness onsite is in the 99th percentile range for for project sample and the mean rim sherd thickness is in the 98th percentile range for the project sample of rim sherds. Only one percent of body sherds are thicker than the maximum value on this site and only two percent of average rim sherd dimensions are likely to be greater.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The artifact assemblage provides no clues as to what was being collected and/or processed onsite. The plain sherds with smooth, combed, or scraped exteriors and the strongly thickened rims indicate occupation during the Latte Period.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.14 Site 66-08-2122 (Temp. No. ASA-44)

Description

This site is an artifact scatter that encompasses approximately 1,442 m² (0.35 acre) in moderately dense secondary-growth limestone forest. The site consists of 165 ceramic sherds and two ground stone specimens. One hundred-eight ceramic sherds were recovered from shovel tests. Mean sherd density is about one item per 9 m².

Fourteen 50 x 50 cm STPs were excavated to bedrock. Soils onsite were somewhat varied. Most STPs encountered silty clays or silty clay loams. Localized areas of silt-loam topsoils were also noted. The depth of bedrock onsite ranged from 25 to 43 cm with an average of 21 cm. Ceramic sherds were recovered from 9 of the 14 STPs. The majority of positive shovel tests (6 or 66 percent) contained artifacts in the upper 20 cm of excavation. Ceramic artifacts were recovered from both strata to a maximum depth of approximately 29 cm in one STPs.

The majority (116 or 70 percent) of ceramic sherds onsite exhibit smooth exterior surfaces. Combed exterior surfaces are noted on 19 (seven percent) sherds; ten sherds (six percent) with scraped exterior surfaces are also noted. Combed sherds occur in the surface collection and from STPs and represent both body sherds and Type B rims. The balance of sherds (20) could not be further specified due to exfoliation. Most sherds (141 or 70 percent) onsite exhibit smooth interior surfaces; twenty-four sherds could not be

further specified due to exfoliation. The ceramic assemblage includes 16 rim sherds classified as Type B; 4 were recovered from STPs. The body sherds range in thickness from 0.42 to 1.7 cm with a mean of 0.93 cm. Rim sherds on this site range in thickness from 1.3 to 2.1 cm with a mean of 1.6 cm. These ranges and means are typical of the project ceramic sample as a whole. The ratio of body sherds to rim sherds (9:1) is unusually high in comparison to the project area as a whole.

The basalt ground stone specimens (FS 22 and FS 52) are incomplete; both exhibit grinding on surfaces and edges. FS 22 is classified as an abrader and measures 6.26 x 2.68 x 1.25 cm. FS 52 is not further classified.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The artifact assemblage provides no clues as to what was being collected and/or processed onsite. The presence of a basalt abrader fragment and an additional ground basalt fragment indicate some diversity of onsite activities, including possible woodworking. The plain ceramics with thickened rims indicate occupation during the Latte period.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.15 Site 66-08-2123 (Temp. No. ASA-45)

Description

This site is an artifact scatter that encompasses approximately 1,174 m² (0.29 acre) in dense secondary-growth limestone forest. The site consists of 17 ceramic sherds, nine of which were recovered from shovel tests, and a complete coral sling stone. Mean artifact density is extremely low, less than one item per 60 m², though ceramic rim sherds and the sling stone are loosely clustered at the site's west end.

Eight 50 x 50 cm STPs were excavated to bedrock. Soil onsite was noted variously as silt-loam, silty clay loam, and sandy clay loam. Two strata, differentiated by soil texture, were noted in three STPs. Bedrock ranged in depth from 15 to 54 cm with a mean of 22 cm. The 54 cm deep STP was anomalous and probably indicates a localized dip in the underlying bedrock shelf. Ceramic sherds were recovered from both strata to a maximum depth of approximately 54 cm.

A slight majority (9 or 53 percent) of ceramic sherds onsite exhibits smooth exterior surfaces. A single sherd with a combed surface is noted; the balance of sherd's exterior

treatments is undetermined due to surface exfoliation. All interior sherd surfaces are smooth or indeterminate due to exfoliation. The body sherds (n = 13) range in thickness from 0.78 to 1.30 cm with a mean of 1.0 cm. Four Type B rim sherds range in thickness from 1.38 to 1.70 cm with a mean of 1.54 cm. These dimensions are typical of the project sample as a whole, as is the ratio of rim sherds to body sherds (4.25:1). The coral sling stone (FS 9) is bi-pointed and shaped by abrasion. The specimen measures 4.64 x 3.11 x 3.16 cm.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus, or possibly one or more pot breaks associated with a foot trail. The plain sherds with smooth or combed exteriors and the presence of thickened rims indicate temporal affinity with the Latte Period. The sling stone indicates hunting activities onsite.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.16 Site 66-08-2125 (Temp. No. ASA-49)

Description

This site is a ceramic scatter that encompasses approximately 20 m² in dense secondary-growth limestone forest. The site consists of eight ceramic sherds, five of which were recovered from a shovel test. Mean artifact density is approximately one item per 3 m². One 50 x 50 cm STP were excavated to bedrock at a depth of 31 cm. Soil onsite was single stratum of silty clay.

All of the sherds onsite exhibit smooth interior and exterior surfaces. Body sherds (n = 7) range in thickness from 0.68 to 1.21 cm with a mean of 0.85 cm. A single Type B rim sherd, 1.56 cm thick, was recovered. These values are representative of the project ceramic sample as a whole.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus, or possibly a pot break associated with a foot trail. The plain sherds with smooth exteriors and the presence of a thickened rim indicate temporal affinity with the Latte Period.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be

expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.17 Site 66-08-2126 (Temp. No. ASA-50)

Description

This site is an artifact scatter that encompasses approximately 1,176 m² (0.29 acre) in moderately dense secondary-growth limestone forest. The site consists of 122 ceramic sherds and one shaped limestone fragment. Seventy-two ceramic sherds were recovered from shovel tests. Mean artifact density is about one item per 10 m².

Thirteen 50 x 50 cm STPs were excavated to bedrock. Soils onsite were somewhat varied. Most STPs encountered silty clays. Localized areas of silty clay loams were also noted. The depth of bedrock onsite ranged from 10 to 32 cm with an average depth of 17 cm. Ceramic sherds were recovered from 9 of the 13 STPs. The majority of positive shovel tests (8 or 88 percent) contained artifacts in the upper 20 cm of excavation. Ceramic artifacts were recovered from both strata to a maximum depth of approximately 32 cm in one STP.

The majority (89 or 73 percent) of ceramic sherds onsite exhibit smooth exterior surfaces; two sherds exhibit scraped surfaces. One possibly incised sherd and one pitted sherd are also noted. The balance of sherds (29) could not be further specified due to exfoliation. Most sherds (112 or 92 percent) exhibit smooth interior surfaces; ten sherds could not be further specified due to exfoliation. The site assemblage includes twelve rim sherds classified as Type B; one of these was recovered from an STP. The body sherds range in thickness from 0.4 to 2.3 cm with a mean of 0.9 cm. Rim sherds on this site range in thickness from 1.0 to 1.8 cm with a mean of 1.4 cm. These ranges and means are typical of the project ceramic sample as a whole; the ratio of body sherds to rim sherds (9:1) is higher than average for the overall project area sample. The limestone fragment (FS 12) is pecked on both surfaces and the edges are ground; it measures 5.7 x 4.4 x 1.2 cm. The artifact's function is uncertain.

Interpretation and Recommendation

This site is interpreted as a briefly occupied resource collection or processing locus. The artifact assemblage provides no clues as to what was being collected and/or processed onsite. The plain ceramics with predominately smooth surfaces and thickened rims indicate occupation during the Latte period.

The low diversity and density of artifacts on this site, as well as an absence of cultural features and temporally or functionally divergent cultural strata, indicate the site's research potential is extremely limited. Further work at this location could not be

expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.1.18 Site 66-08-2127 (Temp. No. ASA-55)

Description

This site is an extensive artifact scatter that encompasses approximately 36,925 m² (9.12 acres) in dense secondary growth limestone forest. The site consists of 207 ceramic sherds, two incomplete stone adzes, an abrader fragment, a pestle fragment, two pieces of ground stone not further specified, an incomplete chisel, and three sling stones, two of which are complete. One complete *Tridacna* shell adze and a fragment of *Tridacna* shell with an abraded edge are also recorded. Mean artifact density onsite is only one item per 169 m²; however, four major artifact clusters occur across the site and artifact density in these areas is markedly higher.

Twenty-four STPs were excavated to bedrock; seven (29 percent) contained a total of 24 ceramic sherds and one sling stone. Soils onsite are noted as stony to gravelly silty clay and silty clay loam. Bedrock ranged in depth from 14 to 49 cm with a mean of 25 cm. One sling stone (FS 92) was recovered from STP 14, Stratum 1. All culturally positive STPs yielded material in the upper 20 cm of excavation.

A majority of ceramic sherds (165 or 80 percent) exhibit smooth exterior surfaces. Combed exteriors are noted on 16 (eight percent); four specimens (less than two percent) are noted as scraped. Corrugated and mat-impressed surfaces are each noted on a single sherd. Surface treatment of the balance (20 or 10 percent) of sherds could not be determined due to exfoliation. Interior sherds surfaces are smooth (n = 188 or 91 percent), scraped (n = 3 or one percent), or undetermined due to exfoliation.

Body sherds (n=155) range in thickness from 0.42 to 1.79 cm, with a mean 1.99 cm. The range of body sherd thickness on this site encompasses the range for the overall project area sample. Fifty-two rim sherds were collected from the site, all noted as Type B. These range in thickness from 1.09 to 2.74 cm with a mean of 1.70 cm. This range also encompasses the overall range for the project area. The means of both categories are representative of the overall samples. The ratio of body sherds to rim sherds (3:1) is low compared to other sites in the project area.

All of the sling stones (FS 29, 92, 135) on this site are bi-pointed forms manufactured from abraded limestone. The incomplete stone adzes (FS 79, 131), chisel (FS 69), abrader (FS 222), and pestle (FS 145) are manufactured from basalt or andesite.

Interpretation and Recommendation

Despite this site's aerial extent, there is no indication of long-term habitation, such as middens, lusong, or house remains. The site may represent several briefly occupied resource collection and processing loci in an area that was frequently revisited. The presence of three sling stones indicates hunting was of some importance. The relatively large number of stone and shell adzes and a stone chisel suggest woodworking onsite. Ground stone fragments indicated possible processing of vegetal foods. The predominately smooth or combed plain ceramic sherds and thickened rims indicate occupation during the Latte period.

Although the site contains a relatively diverse artifact assemblage, an absence of cultural features and temporally or functionally divergent cultural strata, suggest the site's research potential is limited. Further work at this location could not be expected to produce additional information that would be important to the study of prehistory or history. No further management actions are recommended.

3.2 Historic Non-Architectural Sites

3.2.1 Site 66-08-2124 (Temp. No. ASA-47)

Description

This site is a concentration of an estimated 200 glass bottles (Figure 3.6) in an area approximately 83 m² (0.02 acre). This is the only historic material in the project area that is not within a disturbed swath along the southwest edge of the study area used extensively for dumping discarded machinery parts, hardware, and construction materials. Unlike the discarded materials, this site appears to have integrity of location.

The majority of items in the concentration are Coca Cola bottles made of colorless glass. An estimated 150 such bottles are noted. Exact attribute counts are available for 49 bottles representing several different types other than Coca Cola. The following discussion focuses on these bottles.

Amber glass is the most common type and comprises 47 percent (n = 23) of the individually recorded bottles. Among the amber bottles, round, rounded rectangular, rectangular, and half-circle forms are noted with crown, external thread, straight brandy, and beaded finishes. Probable contents of the amber bottles include beer or ale (18 or 78 percent), medicine (two or nine percent), and one each of toiletries, chemicals, and liquor.

Colorless glass comprises 41 percent (n = 20) of the individually recorded bottles. Most of these are round or rounded rectangular forms with external thread finishes. One prescription finish and one Champaign finish are also noted. Probable contents of the

colorless glass bottles include medicine (10 or 50 percent), toiletries (five or 25 percent), vinegar (one or five percent), and wine or Champaign (one or five percent). Probable contents of three clear glass bottles (15 percent) are undetermined. The remaining six bottles recorded individually are three light green Coca Cola bottles, one green oval shaped bottle with an external thread finish, possibly a liquor bottle, one round milkglass toiletry bottle, and one cobalt colored external thread toiletry bottle.

Maker's marks on these bottles provide considerable information about the range of manufacturing dates for the bottles in the dump. Five manufacturers are identified. The name of the manufacturer and the date ranges associated with the particular marks noted on this site are summarized in Table 3.2.

Table 3.2. Glass manufacturers' marks noted on bottles, Site 66-08-2124.

Manufacturer	Mark	Date Range	Reference
Knox Glass Co.	"J" in a shield	1932-1953	Toulouse 1971
Fairmont Glass Works	"F" in a hexagon	1933-1968	Toulouse 1971
Anchor Hocking Co.	"H" over an anchor	1937-1977	Toulouse 1971
Armstrong Cork Co. (Glass Div.)	"A" in a circle	1938-1969	Toulouse 1971
Owens-Illinois Glass Co.	"I" in diamond and circle	1929-1954	Toulouse 1971

Interpretation and Recommendation

If this dump represents a short-term event, which seems likely, the manufacturer's logos of these bottles indicate the dump probably accumulated no later than about 1953, the earliest known end date for any of the logos. It seems reasonable to assume a date range of c. 1945-1953 for this site. The large proportion of pop and beer or ale bottles, as well as an absence of condiment, spice, or food containers indicate this concentration is not associated with a domestic household and probably represents casual dumping by military personnel and/or civilian contractors working in the vicinity.

Although this site appears to represent an intact bottle dump with integrity of location and associated with post-WWII to early Cold War era activities, lack of association with other historic features and an absence of other artifact types indicate that all the information available from this site was gathered during recording. Further work at this location could not be expected to produce additional information that would be important to the study of history. No further management actions are recommended.



Figure 3.6. Overview of Site 66-08-2124.

3.2.2 Site 66-08-2128 (Temp. No. ASA-56)

Description

This site is a poured rectangular concrete pad 20' 2-1/4" long and 4' 8-1/2" wide (Figure 3.7) with the long axis oriented 330 degrees (true azimuth). The pad is in an area that has been disturbed by c. 1960s-80s refuse dumping, a portion of which is an IRP site. Modern construction refuse and structural remnants are present in this area. This pad is identifiable as a historic feature by the inscribed dates, "10/9/45" and "10/10/45" (Figure 3.8). The inscriptions "Oct 10" and "Oct 9, 1945" are also visible. The surnames "Dykester," "Wheeler," and "Burton" are inscribed near the dates. The name "Mr. S H Burton" is also inscribed in another area near the name "S W bolins." Additional incomplete or illegible names are noted. The only complete name inscribed on the pad is "Mr John H Crawford." Also inscribed on the pad is "Boy what/ A/ hell holl." No cultural features or artifacts are associated with this pad.

Most Andersen AFB records from the 1940s were lost during Supertyphoon Karen in 1962. A single aerial photograph of the general North Field area taken on April 30, 1945 shows some areas cleared of vegetation in the general vicinity of this site but no structures. The project area is in the background of this photograph, which was taken at an oblique angle and is of poor resolution, making definitive statements about the locations of clearing activities impossible. A 1956 aerial photograph with better resolution shows dense vegetation throughout the project area with no indications of structures in the site's vicinity.

Interpretation and Recommendation

The Social Security Death Index database lists 45 records for the name John H. Crawford. Several individuals in this group would have been eligible for military service in WWII based on their birth dates; all of these men died after 1945.

This feature appears to post-date the surrender of Japan on September 2, 1945. Consequently, it is not associated with WWII as a broad pattern in history. Its apparent date of construction places it in a transitional period between WWII and the Cold War era. Aerial photographs indicate no structures were present in the site vicinity six months prior to the inscribed dates and by 1956 any structure associated with the concrete pad had been removed and the area reforested.

This feature cannot be directly linked to significant individuals or events and exhibits no potential as an archaeological site. Further work at this location could not be expected to produce additional information that would be important to the study of history. No further management actions are recommended.



Figure 3.7. Site 66-08-2128 concrete pad cleared of overburden and vegetation.



Figure 3.8. Detail of inscribed date on concrete pad.

3.3 Historic Architectural Sites

3.3.1 Site 66-08-2129 (Building 18020)

Description

Building 18020 was constructed in 1959 as a multipurpose maintenance dock for servicing aircraft (alternately known as an aircraft servicing dock, or nose dock hangar). Designed by Luria Engineering, New York, NY, in 1957, the multipurpose structure accommodates various aircraft types. The specific building at Andersen AFB is a MB3A Maintenance Dock (the Luria Engineering designation), which would primarily service the B-52. Building 18020 is a one-story structure (Figure 3.9) that slopes in height from the south (rear elevation) to the north (front elevation). The rear of the building is oriented away from the runway and contains the nose dock section (this extension accommodated the nose of a parked aircraft). A large, segmented, horizontally opening door spans the width of the front elevation. The building's overall dimensions are 128 feet from front to rear and 242.66 feet in width. The clear span area, (the area of the building that will accommodate an aircraft's wing span) is 190 feet in width. Building

18020 is steel framed and entirely covered with corrugated, sheet steel. The floor and foundation are both steel reinforced concrete.

Building 18020 has undergone multiple modifications and alterations beginning in 1963. Typhoon Karen, November, 1962, caused extensive damage to most buildings on Andersen including all the aircraft hangars. The sustained winds from Karen were estimated at over 170 miles per hour and gusts at over 200 miles per hour. A reference on the Andersen real property card notes that the hangar is constructed to withstand a wind load of 125 miles per hour. Vinnell-Wall, San Francisco was contracted to repair the typhoon damage, which included replacing many sections of the exterior covering. In 1971, the civil engineering squadron at Andersen AFB undertook significant repairs of the building. The exterior was sandblasted and painted and damaged siding on the walls and roof was replaced. Roll-up steel doors on the rear elevation were removed and replaced by new doors designed to withstand 100 mile-per-hour wind pressure. The horizontal sliding steel doors on the front elevation were removed, cleaned and put back in place. In May 1976, Typhoon Pamela caused extensive damage to the hangar; in August 1992 the building was damaged by Typhoon Omar and again in 2002 by Typhoon Pongsona. The last major alteration, completed by civil engineering at Andersen was the installation in 1999 of an air conditioning system to support the B-2 bombers deployed on base.

Interpretation and Evaluation

Constructed as a maintenance dock for servicing multiple aircraft types, Building 18020 is a standard design that exists at Air Force bases throughout the United States. The hangar has undergone numerous repairs and renovations due to significant physical damage inflicted by multiple typhoons. While Building 18020 is representative of the work of a significant engineering firm, Luria Engineering, and has been maintained and used as a hangar over time, it lacks exceptional significance under Criterion Consideration G for buildings less than 50 years of age. Building 18020 lacks special associations with any major Cold War-era missions or persons at Andersen AFB. For these reasons, Building 18020 is recommended ineligible for listing on the NRHP.



Figure 3.9. North-northwest-facing view (south or rear elevation) of Building 18020.

3.3.2 Site 66-08-2130 (Building 18027)

Description

Building 18027 was constructed in 1968 as a multipurpose maintenance dock for servicing aircraft (alternately known as an aircraft servicing dock, or nose dock hangar). Designed by Luria Engineering, New York, NY, in 1957, the baseline drawings were adapted for construction at Andersen in 1966 by Urbahn-Wall, Architects and Engineers, Washington, D.C. Originally constructed as a multipurpose maintenance dock, the hangar was designed to accommodate various aircraft types. The specific building at Andersen AFB is a MB3A Maintenance Dock (the Luria Engineering designation), which would primarily service the B-52. Building 18027 is a one-story structure (Figure 3.10) that slopes in height from the south (rear elevation) to the north (front elevation). The rear of the building is oriented away from the runway and contains the nose dock section (this extension accommodated the nose of a parked aircraft). A small shed addition is attached to the west side of the nose dock section. A large, segmented, horizontally opening door spans the width of the front elevation. The building's overall dimensions are 128 feet from front to rear and 242 feet, 8 inches in width. The clear span area, (the area of the building that will accommodate an aircraft's wing span) is 190 feet in width.

Building 18027 is steel framed and entirely covered with corrugated, sheet steel. The floor and foundation are both steel reinforced concrete.

Building 18027 has undergone multiple modifications and alterations beginning in May 1976, with repairs to damage caused by Typhoon Pamela. In 1979 a concrete block addition (20' x 46') was designed by civil engineering, Andersen AFB and constructed on the east elevation. A large concrete block building is sited directly south of the hangar, and though it seems to be an addition it is actually a separate structure, Building 18030. Repairs were again made in 1992 to damage caused by Typhoon Omar in August of that year. In 1995 the hangar's electrical and lighting system were replaced. In 2002, Typhoon Pongsona damaged Building 18027, which required additional repairs.

Interpretation and Recommendation

Constructed as a maintenance dock for servicing multiple aircraft types, Building 18027 is a standard design that exists at Air Force bases throughout the United States. The hangar has undergone numerous repairs and renovations due to significant physical damage inflicted by multiple typhoons. While Building 18027 is representative of the work of a significant engineering firm, Luria Engineering, and has been maintained and used as a hangar over time, it lacks exceptional significance under Criterion Consideration G for buildings less than 50 years of age. Building 18027 lacks special associations with any major Cold War-era missions or persons at Andersen AFB. For these reasons, Building 18027 is recommended ineligible for listing in the NRHP.



Figure 3.10. North-facing view (south or rear elevation) of Building 18027.

4.0 Management Recommendations

4.1 Prehistoric Sites

Criteria for NRHP eligibility are set forth in 36 CFR 60.4. A summary of these criteria is provided in the attached research design. All of the prehistoric sites in this project are assessed in relation to criterion D, which states that sites may be considered eligible for NRHP listing *that have yielded, or may be likely to yield, information important in prehistory or history.*

Taken as a whole, the prehistoric sites have provided minimal information for the settlement and chronology questions in the project's research design. However, each site in the project area indicates the same basic land use pattern: short-term occupation of resource collection and processing areas that probably occurred in support of larger, permanent settlements outside the study area. The diagnostic ceramic sherds suggest a single temporal period; no intact buried cultural strata are present, and no discrete features, such as hearths or middens that might yield material for radiometric dating or botanical analysis, were found. Variation in ceramic vessel surface treatments and site artifact assemblages are not sufficient to warrant further investigation. The current site sample fails to address the subsistence and technology questions in the research design.

In summary, the project area's prehistoric information content appears highly redundant and fails to meet the criterion of being likely to yield important information. When assessed under Criterion D these sites lack integrity of association, which, in this context is the strength of association between the sites' data content and important research questions (Little et al. 2000). Consequently, the prehistoric sites are recommended ineligible for NRHP listing and no further work is recommended.

Isolates are not evaluated for NRHP eligibility. The National Register defines an archeological property as a "place or places where the remnants of a past culture *survive in a physical context that allows for the interpretation of these remains* [emphasis added] (Little et al. 2000)." By their nature, isolated artifacts are out of context with broader cultural patterns and any information gathered from them is of extremely limited utility.

4.2 Historic Non-Architectural Sites

Historic non-architectural sites in the current project area are assessed under Criteria A-C in addition to D. Criterion A, which states a site may eligible for listing if it is *associated with events that have made a significant contribution to the broad patterns of our history*, is appropriate given Andersen AFB's role in WWII and the Cold War. It is important to note, however, that mere association with historic events is not sufficient to qualify a site

under this criterion. A property's specific role in the historic period must be considered important as well (Little et al. 2000).

The manufacturing date range of bottles on Site 66-08-2124 (1929 to 1977) is too broad to allow reliable assignment to a particular period. The assumed construction date of 66-08-2128, October 9-10, 1945, post-dates the cessation of WWII hostilities and predates the start of the Cold War era in 1947. When assessed under Criterion A these sites lack integrity of association. Criterion B is not applicable since there is no evidence directly linking these sites to the lives of persons significant in our past.

Criterion C states that *resources that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction* may be listed on the NRHP. The intent of Criterion C is to distinguish properties that are significant expressions of culture or technology, especially architectural, artistic, or engineering properties (Little et al. 2000). Sites 66-08-2124 and 66-08-2128 fail to meet this criterion. Both are generic site types; bottle dumps and concrete pads occur throughout the historic period. Neither site embodies the distinctive characteristics of a type or period. Assuming that 66-08-2128 once contained a structure, it can further be argued that this site lacks integrity of materials and design.

Since Site 66-08-2128 contains no archaeological material other than a concrete pad, the site clearly fails to meet Criterion D. Site 66-08-2124 contains archaeological material (historic bottles) but these represent highly redundant information content. Further work at the site would not produce any information beyond what has already been gathered. Sites 66-08-2124 and 66-08-2128 are recommended ineligible for NRHP inclusion; no further actions are recommended.

4.3 Historic Architectural Sites

Buildings 18020 (Site 66-08-2129) and 18027 (Site 66-08-2130), designed by Luria Engineering, have been maintained as hangars over time. The installation of new doors in Building 18020, an addition to Building 18027, and numerous repairs as a result of typhoon damage have impacted their integrity to a limited extent. Although both hangars are associated with the Cold War-era mission of Andersen AFB, there is no evidence of association with significant missions or persons at Andersen AFB. Therefore, both buildings lack exceptional significance under Criterion Consideration G for buildings less than 50 years of age and are, consequently, recommended ineligible for listing in the NRHP. No further actions are recommended.

Table 4.1. Aspects of integrity and National Register criteria assessments for sites in the project area.

Site No.	Aspects of Integrity							National Register Criteria				
	Location	Association	Design	Materials	Workmanship	Feeling	Setting	A	B	C	D	G
66-08-2109	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2110	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2111	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2112	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2113	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2114	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2115	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2116	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2117	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2118	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2119	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2120	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2121	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2122	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2123	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2124	Yes	No	No	Yes	N/A	N/A	Yes	No	No	No	No	N/A
66-08-2125	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2126	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2127	Yes	No	N/A	Yes	Yes	N/A	Yes	N/A	N/A	N/A	No	N/A
66-08-2128	Yes	No	N/A	Yes	N/A	N/A	Yes	No	No	No	No	N/A
66-08-2129	Yes	Yes	Yes	No	N/A	Yes	Yes	No	No	No	No	No
66-08-2130	Yes	Yes	Yes	No	N/A	Yes	Yes	No	No	No	No	No

5. References Cited

Hunter-Thompson, R. L. and B. M. Butler

- 1995 An Overview of Northern Marianas Prehistory. *Micronesian Archaeological Survey Report* No. 31. Division of Historic Preservation, Saipan, CNMI.

International Archaeological Research Institute

- 2003 Final Integrated Cultural Resource Management Plan For Andersen Air Force Base, Guam, 2003 Update. Manuscript on file, Andersen AFB.

Little, B., E. M. Seibert, J. Townsend, J. H. Sprinkle, Jr., J Knorl

- 2000 National Register Bulletin Guidelines for Evaluating and Registering Archaeological Properties. *National Register Bulletin* No. 36, U.S. Department of the Interior, National Park Service, Washington, D.C.

Moore, D. R.

- 2000 *Guam's Prehistoric Pottery and Its Chronological Sequence*. Micronesian Archaeological Research Services, Guam.

Toulouse, J.

1971. *Bottle Makers and Their Marks*. Blackburn Press, Caldwell, New Jersey.

Appendix 1: Abbreviated Prehistoric Site Summaries

Site No: 66-08-2109
 Site Type: Ceramic scatter
 Temporal Affiliation: Latte Period
 NRHP Recommendation: Not Eligible
 Ceramic Count: 42
 Shell Count: 0
 Lithics Count: 0
 Ground Stone Count: 0
 STPs Excavated: 9
 Positive STPs: 4
 Max. Depth/Sediments: 25 cm
 Max. Depth/Artifacts: 25 cm
 Soil Strata: 1
 Culturally Positive Strata: 1
 Mean Body Sherd Thickness: 0.94 cm (n = 35)
 Mean Rim Sherd Thickness: 1.57 cm (n = 7)
 Body Sherd Percentile: .54
 Rim Sherd Percentile: .48

Site No: 66-08-2110
 Site Type: Artifact scatter
 Temporal Affiliation: Latte Period
 NRHP Recommendation: Not Eligible
 Ceramic Count: 42
 Shell Count: 0
 Lithics Count: 0
 Ground Stone Count: 1
 STPs Excavated: 11
 Positive STPs: 6
 Max. Depth/Sediments: 28 cm
 Max. Depth/Artifacts: 27 cm
 Soil Strata: 2
 Culturally Positive Strata: 2
 Mean Body Sherd Thickness: 1.01 cm (n = 34)
 Mean Rim Sherd Thickness: 1.64 cm (n = 8)
 Body Sherd Percentile: .63
 Rim Sherd Percentile: .60

Site No:	66-08-2111
Site Type:	Ceramic scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	12
Shell Count:	0
Lithics Count:	0
Ground Stone Count:	0
STPs Excavated:	2
Positive STPs:	2
Max. Depth/Sediments:	73 cm
Max. Depth/Artifacts:	20 cm
Soil Strata:	2
Culturally Positive Strata:	2
Mean Body Sherd Thickness:	1.34 cm (n = 10)
Mean Rim Sherd Thickness:	1.75 cm (n = 2)
Body Sherd Percentile:	.91
Rim Sherd Percentile:	.72

Site No:	66-08-2112
Site Type:	Ceramic scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	18
Shell Count:	0
Lithics Count:	0
Ground Stone Count:	0
STPs Excavated:	2
Positive STPs:	2
Max. Depth/Sediments:	36 cm
Max. Depth/Artifacts:	36 cm
Soil Strata:	2
Culturally Positive Strata:	2
Mean Body Sherd Thickness:	.91 cm (n = 13)
Mean Rim Sherd Thickness:	.94 cm (n = 5)
Body Sherd Percentile:	.48
Rim Sherd Percentile:	.1

Site No:	66-08-2113
Site Type:	Artifact scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	75
Shell Count:	0
Lithics Count:	0
Ground Stone Count:	1
STPs Excavated:	21
Positive STPs:	13
Max. Depth/Sediments:	49 cm
Max. Depth/Artifacts:	49 cm
Soil Strata:	2
Culturally Positive Strata:	2
Mean Body Sherd Thickness:	1.05 cm (n = 73)
Mean Rim Sherd Thickness:	1.54 cm (n = 2)
Body Sherd Percentile:	.69
Rim Sherd Percentile:	.42

Site No:	66-08-2114
Site Type:	Ceramic scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	11
Shell Count:	0
Lithics Count:	0
Ground Stone Count:	0
STPs Excavated:	1
Positive STPs:	1
Max. Depth/Sediments:	28 cm
Max. Depth/Artifacts:	10 cm
Soil Strata:	1
Culturally Positive Strata:	1
Mean Body Sherd Thickness:	.94 cm (n = 9)
Mean Rim Sherd Thickness:	1.50 cm (n = 2)
Body Sherd Percentile:	.54
Rim Sherd Percentile:	.37

Site No:	66-08-2115
Site Type:	Ceramic scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	16
Shell Count:	0
Lithics Count:	0
Ground Stone Count:	0
STPs Excavated:	10
Positive STPs:	2
Max. Depth/Sediments:	32 cm
Max. Depth/Artifacts:	23 cm
Soil Strata:	2
Culturally Positive Strata:	1
Mean Body Sherd Thickness:	1.06 cm (n = 14)
Mean Rim Sherd Thickness:	1.43 cm (n = 2)
Body Sherd Percentile:	.70
Rim Sherd Percentile:	.27

Site No:	66-08-2116
Site Type:	Ceramic scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	8
Shell Count:	0
Lithics Count:	0
Ground Stone Count:	0
STPs Excavated:	1
Positive STPs:	1
Max. Depth/Sediments:	18 cm
Max. Depth/Artifacts:	11 cm
Soil Strata:	2
Culturally Positive Strata:	1
Mean Body Sherd Thickness:	.71 cm (n = 8)
Mean Rim Sherd Thickness:	n/a
Body Sherd Percentile:	.15
Rim Sherd Percentile:	n/a

Site No:	66-08-2117
Site Type:	Artifact scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	88
Shell Count:	16
Lithics Count:	4
Ground Stone Count:	7
STPs Excavated:	29
Positive STPs:	9
Max. Depth/Sediments:	50 cm
Max. Depth/Artifacts:	37 cm
Soil Strata:	2
Culturally Positive Strata:	2
Mean Body Sherd Thickness:	.97 cm (n = 78)
Mean Rim Sherd Thickness:	1.89 cm (n = 10)
Body Sherd Percentile:	.58
Rim Sherd Percentile:	.81

Site No:	66-08-2118
Site Type:	Artifact scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	115
Shell Count:	1
Lithics Count:	0
Ground Stone Count:	1
STPs Excavated:	19
Positive STPs:	11
Max. Depth/Sediments:	56 cm
Max. Depth/Artifacts:	50 cm
Soil Strata:	2
Culturally Positive Strata:	2
Mean Body Sherd Thickness:	1.03 cm (n = 92)
Mean Rim Sherd Thickness:	1.6 cm (n = 23)
Body Sherd Percentile:	.66
Rim Sherd Percentile:	.53

Site No:	66-08-2119
Site Type:	Artifact scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	18
Shell Count:	1
Lithics Count:	0
Ground Stone Count:	2
STPs Excavated:	12
Positive STPs:	2
Max. Depth/Sediments:	26 cm
Max. Depth/Artifacts:	20 cm
Soil Strata:	1
Culturally Positive Strata:	1
Mean Body Sherd Thickness:	1.2 cm (n = 15)
Mean Rim Sherd Thickness:	1.8 cm (n = 3)
Body Sherd Percentile:	.82
Rim Sherd Percentile:	.74

Site No:	66-08-2120
Site Type:	Ceramic scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	8
Shell Count:	0
Lithics Count:	0
Ground Stone Count:	0
STPs Excavated:	1
Positive STPs:	1
Max. Depth/Sediments:	n/a (bottom depth not recorded)
Max. Depth/Artifacts:	n/a (bottom depth not recorded)
Soil Strata:	2
Culturally Positive Strata:	2
Mean Body Sherd Thickness:	.91 cm (n = 7)
Mean Rim Sherd Thickness:	1.59 cm (n = 1)
Body Sherd Percentile:	.48
Rim Sherd Percentile:	.51

Site No:	66-08-2121
Site Type:	Artifact scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	71
Shell Count:	1
Lithics Count:	0
Ground Stone Count:	0
STPs Excavated:	11
Positive STPs:	6
Max. Depth/Sediments	29 cm
Max. Depth/Artifacts:	26 cm
Soil Strata:	2
Culturally Positive Strata:	1
Mean Body Sherd Thickness:	.99 cm (n = 65)
Mean Rim Sherd Thickness:	1.80 cm (n = 6)
Body Sherd Percentile:	.61
Rim Sherd Percentile:	.74

Site No:	66-08-2122
Site Type:	Artifact scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	165
Shell Count:	0
Lithics Count:	0
Ground Stone Count:	2
STPs Excavated:	14
Positive STPs:	9
Max. Depth/Sediments:	43 cm
Max. Depth/Artifacts:	29 cm
Soil Strata:	2
Culturally Positive Strata:	2
Mean Body Sherd Thickness:	.93 cm (n = 149)
Mean Rim Sherd Thickness:	1.6 cm (n = 16)
Body Sherd Percentile:	.52
Rim Sherd Percentile:	.53

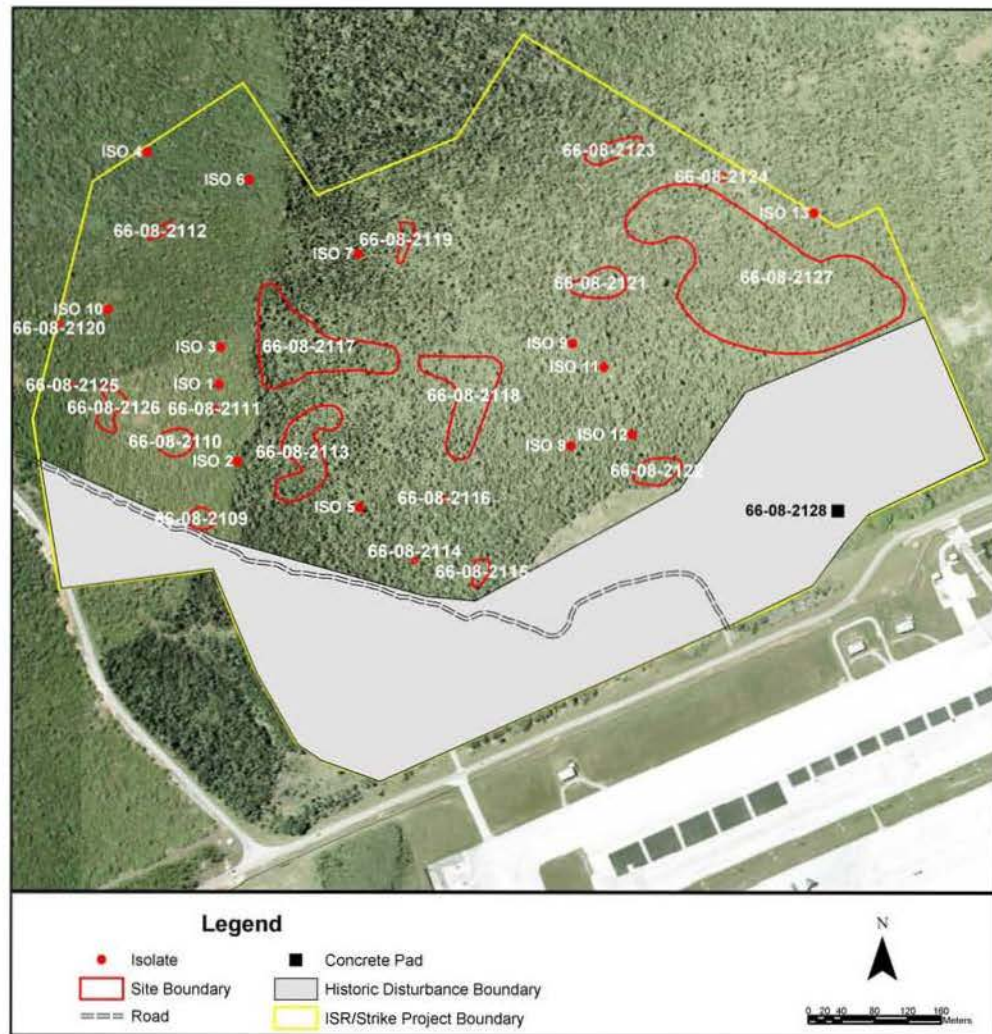
Site No: 66-08-2123
 Site Type: Artifact scatter
 Temporal Affiliation: Latte Period
 NRHP Recommendation: Not Eligible
 Ceramic Count: 17
 Shell Count: 1 (actually coral)
 Lithics Count: 0
 Ground Stone Count: 0
 STPs Excavated: 8
 Positive STPs: 4
 Max. Depth/Sediments: 54 cm
 Max. Depth/Artifacts: 54 cm
 Soil Strata: 2
 Culturally Positive Strata: 2
 Mean Body Sherd Thickness: 1.0 cm (n = 13)
 Mean Rim Sherd Thickness: 1.54 cm (n = 4)
 Body Sherd Percentile: .62
 Rim Sherd Percentile: .42

Site No: 66-08-2125
 Site Type: Ceramic scatter
 Temporal Affiliation: Latte Period
 NRHP Recommendation: Not Eligible
 Ceramic Count: 8
 Shell Count: 0
 Lithics Count: 0
 Ground Stone Count: 0
 STPs Excavated: 1
 Positive STPs: 1
 Max. Depth/Sediments: 31 cm
 Max. Depth/Artifacts: 31 cm
 Soil Strata: 1
 Culturally Positive Strata: 1
 Mean Body Sherd Thickness: .85 cm (n = 7)
 Mean Rim Sherd Thickness: 1.56 cm (n = 1)
 Body Sherd Percentile: .39
 Rim Sherd Percentile: .45

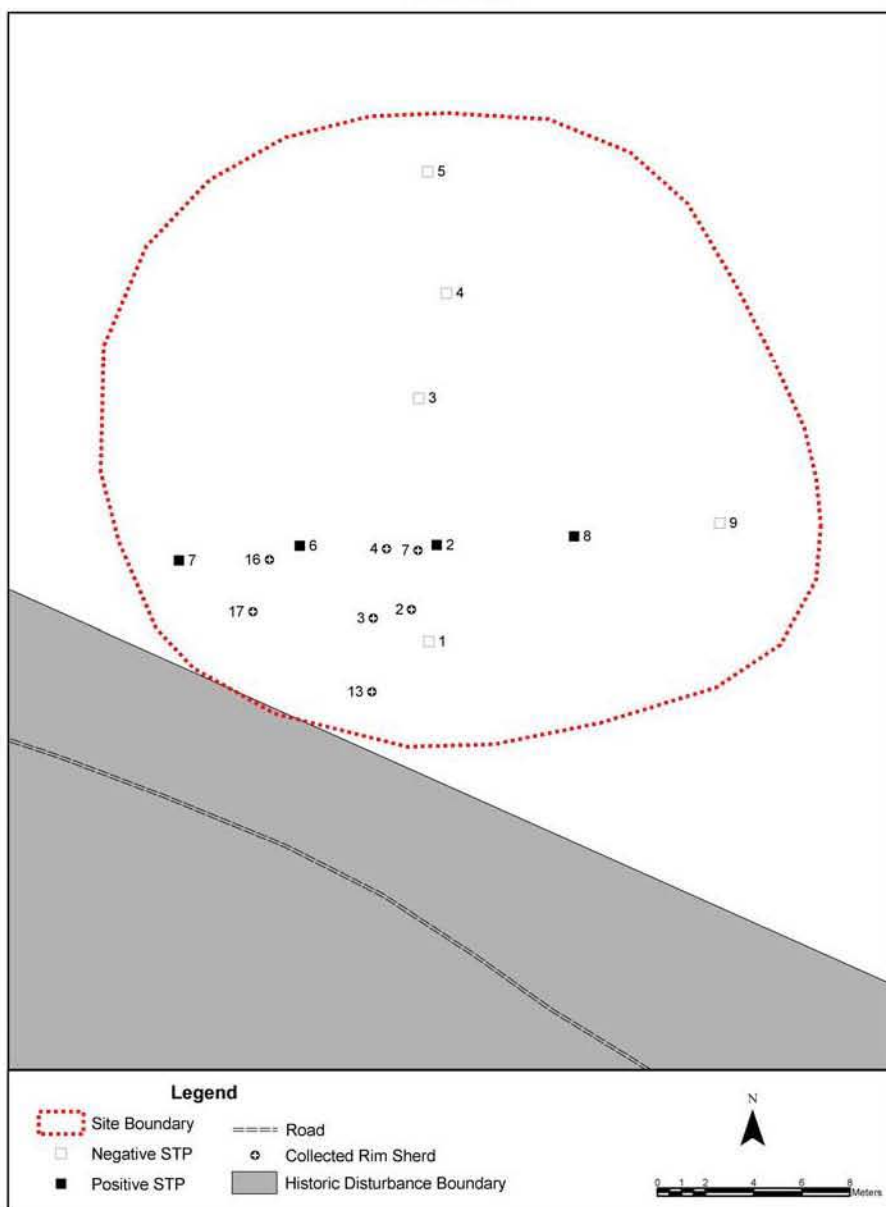
Site No:	66-08-2126
Site Type:	Artifact scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	122
Shell Count:	0
Lithics Count:	0
Ground Stone Count:	1
STPs Excavated:	13
Positive STPs:	9
Max. Depth/Sediments:	32 cm
Max. Depth/Artifacts:	32 cm
Soil Strata:	2
Culturally Positive Strata:	2
Mean Body Sherd Thickness:	.9 cm (n = 110)
Mean Rim Sherd Thickness:	1.4 cm (n = 12)
Body Sherd Percentile:	.47
Rim Sherd Percentile:	.25

Site No:	66-08-2127
Site Type:	Artifact scatter
Temporal Affiliation:	Latte Period
NRHP Recommendation:	Not Eligible
Ceramic Count:	207
Shell Count:	2
Lithics Count:	4
Ground Stone Count:	6
STPs Excavated:	24
Positive STPs:	7
Max. Depth/Sediments:	49 cm
Max. Depth/Artifacts:	20 cm
Soil Strata:	2
Culturally Positive Strata:	1
Mean Body Sherd Thickness:	1.99 cm (n = 155)
Mean Rim Sherd Thickness:	1.70 cm (n = 52)
Body Sherd Percentile:	.99
Rim Sherd Percentile:	.68

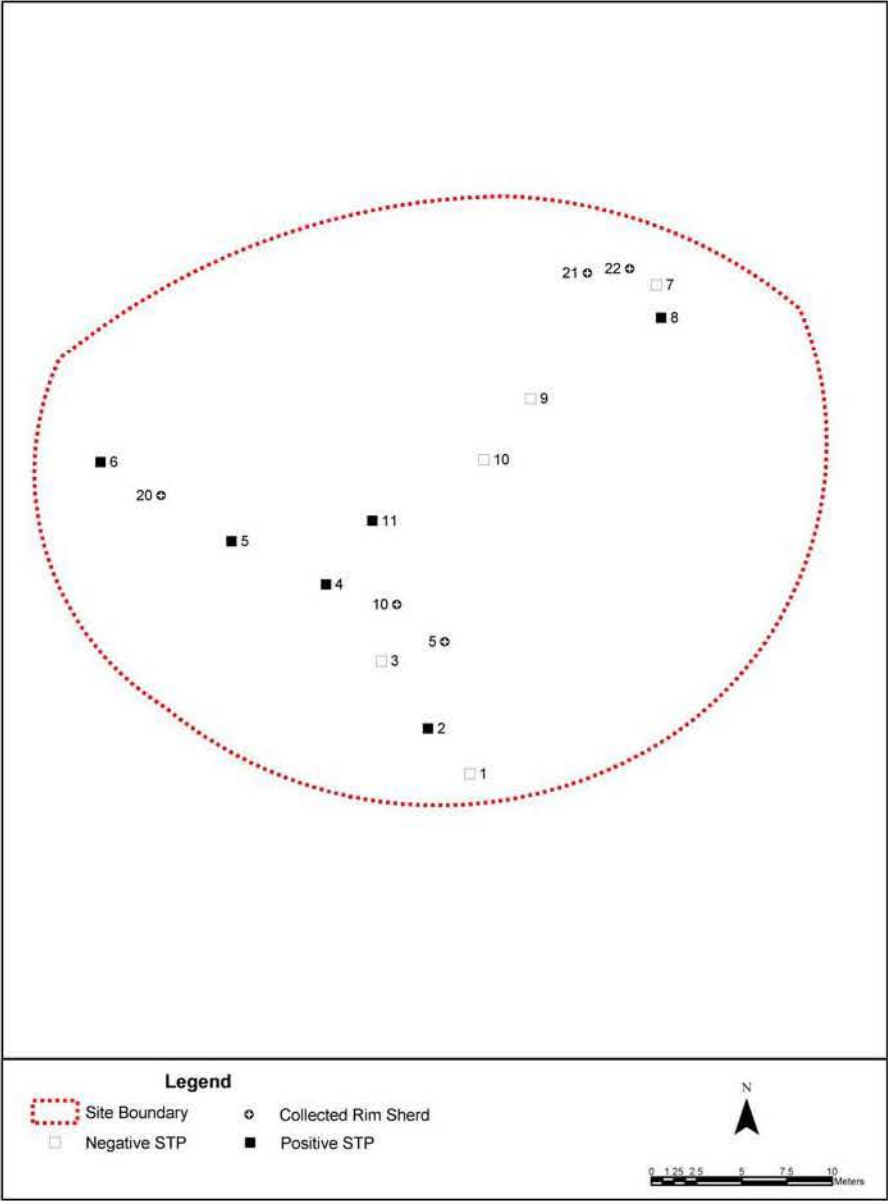
Appendix II: Prehistoric Site Locator Map and Prehistoric Site Sketch Maps



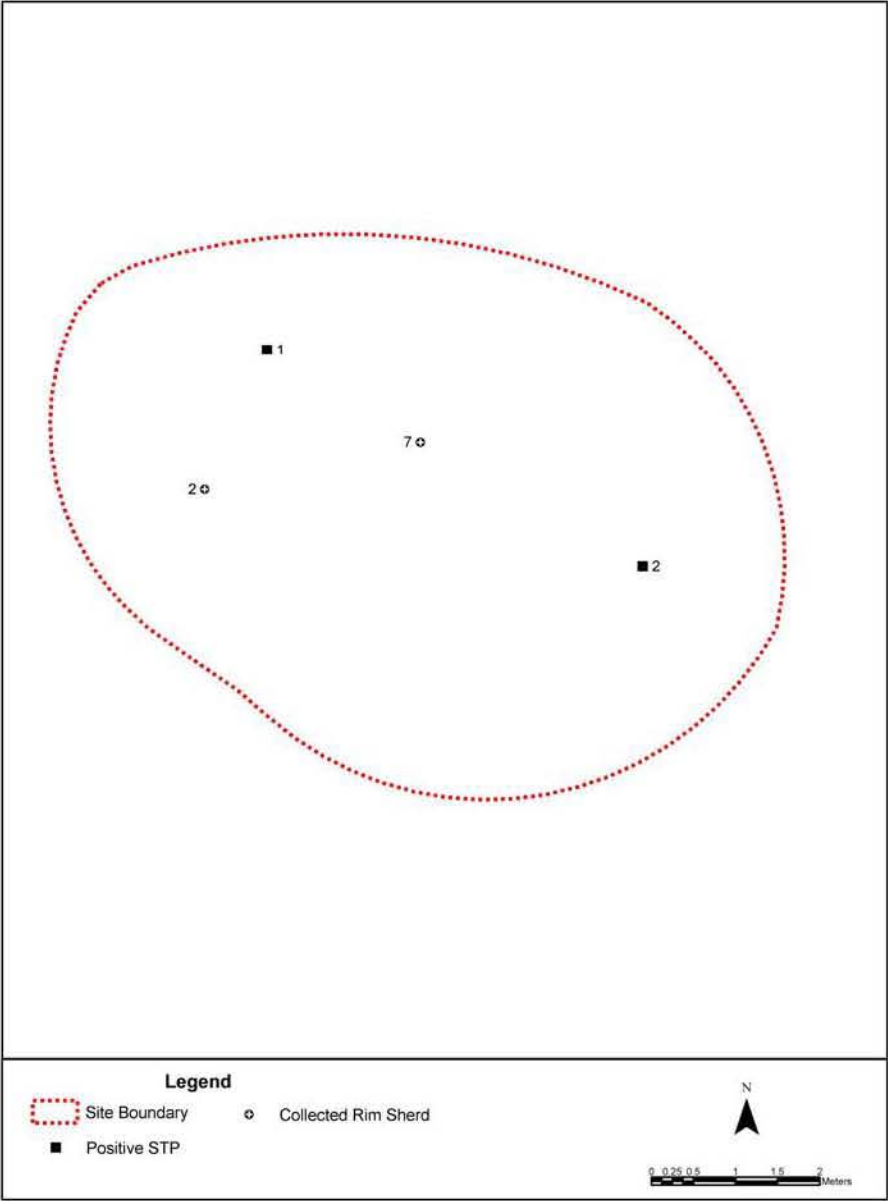
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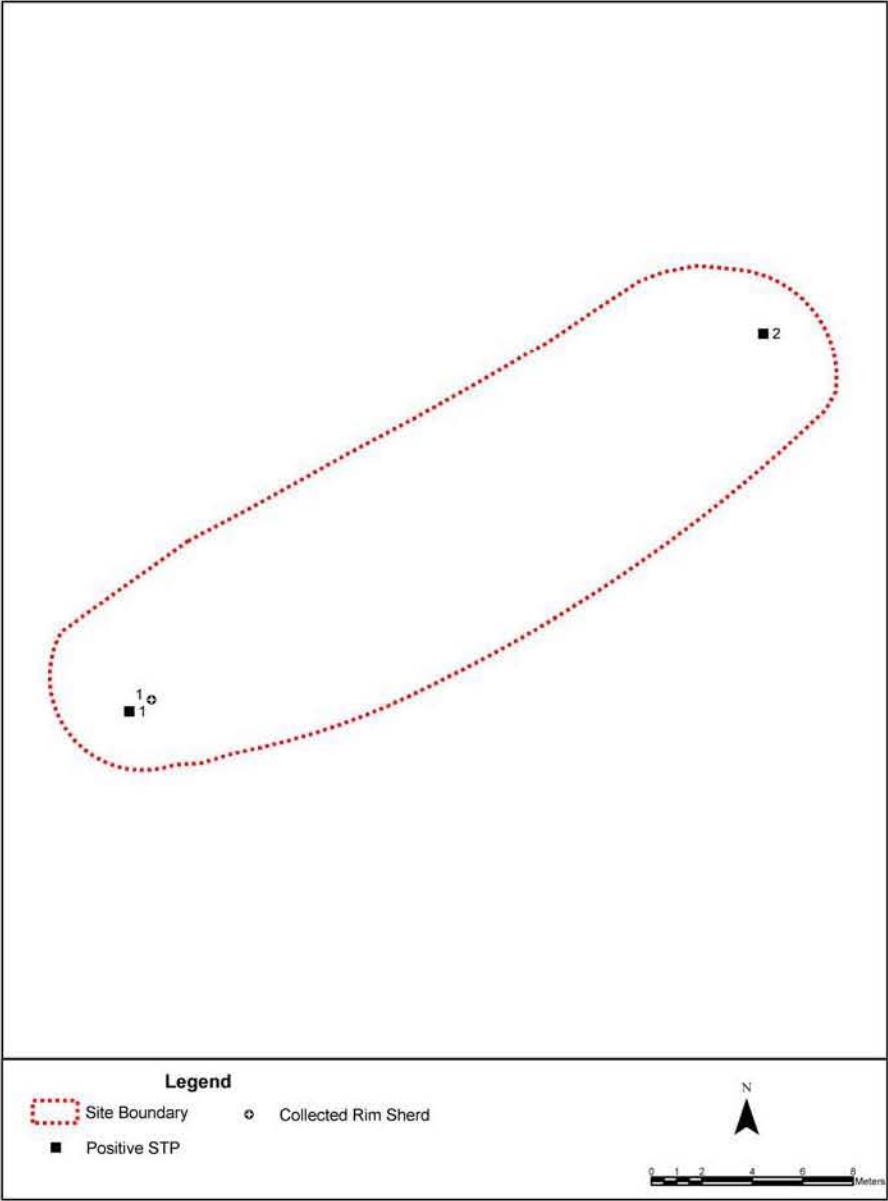


66-08-2110

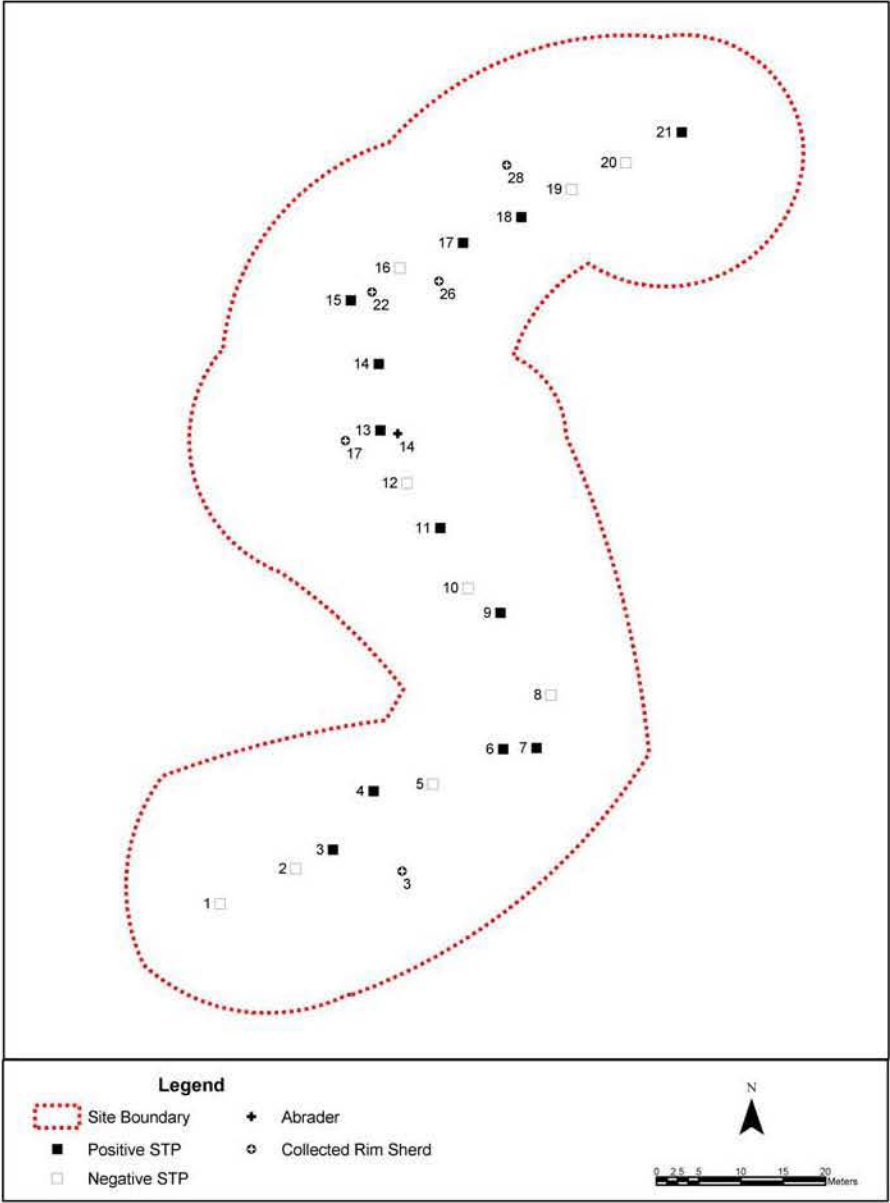


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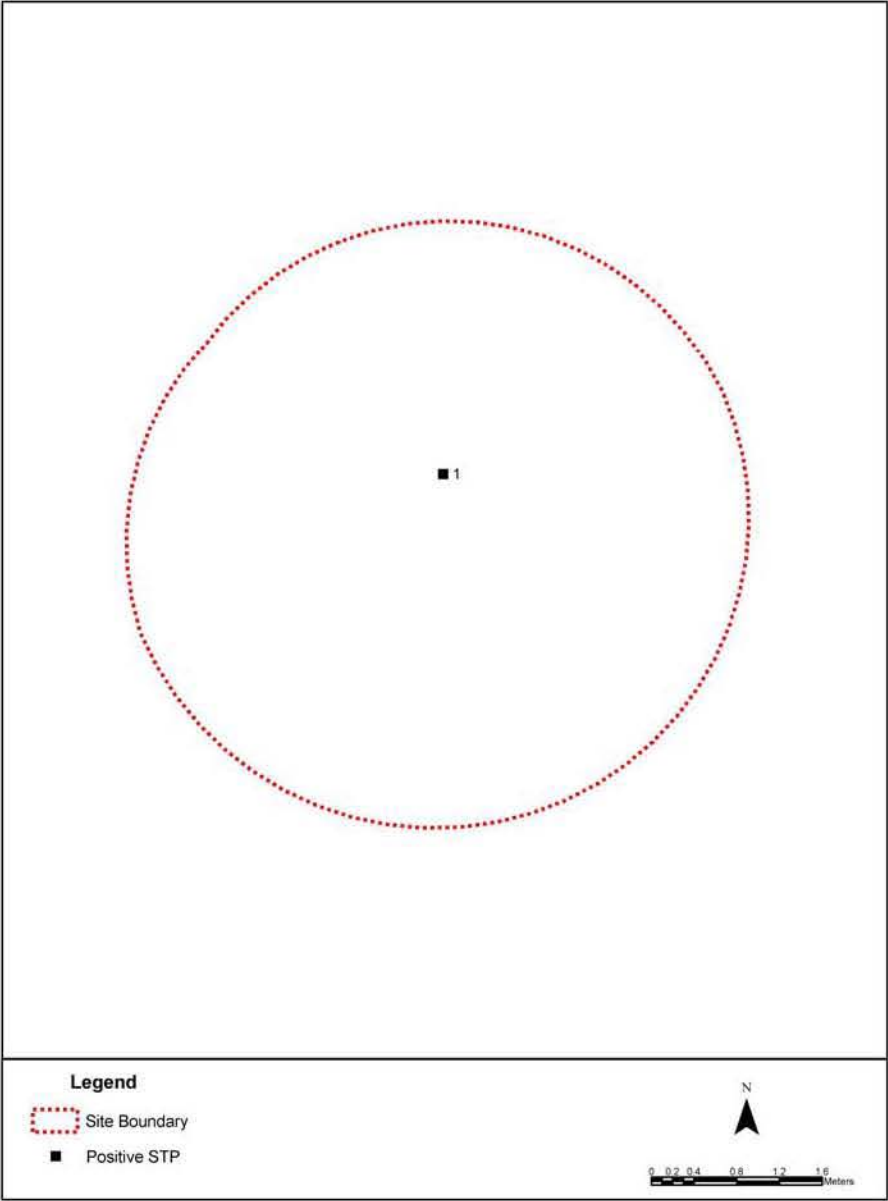




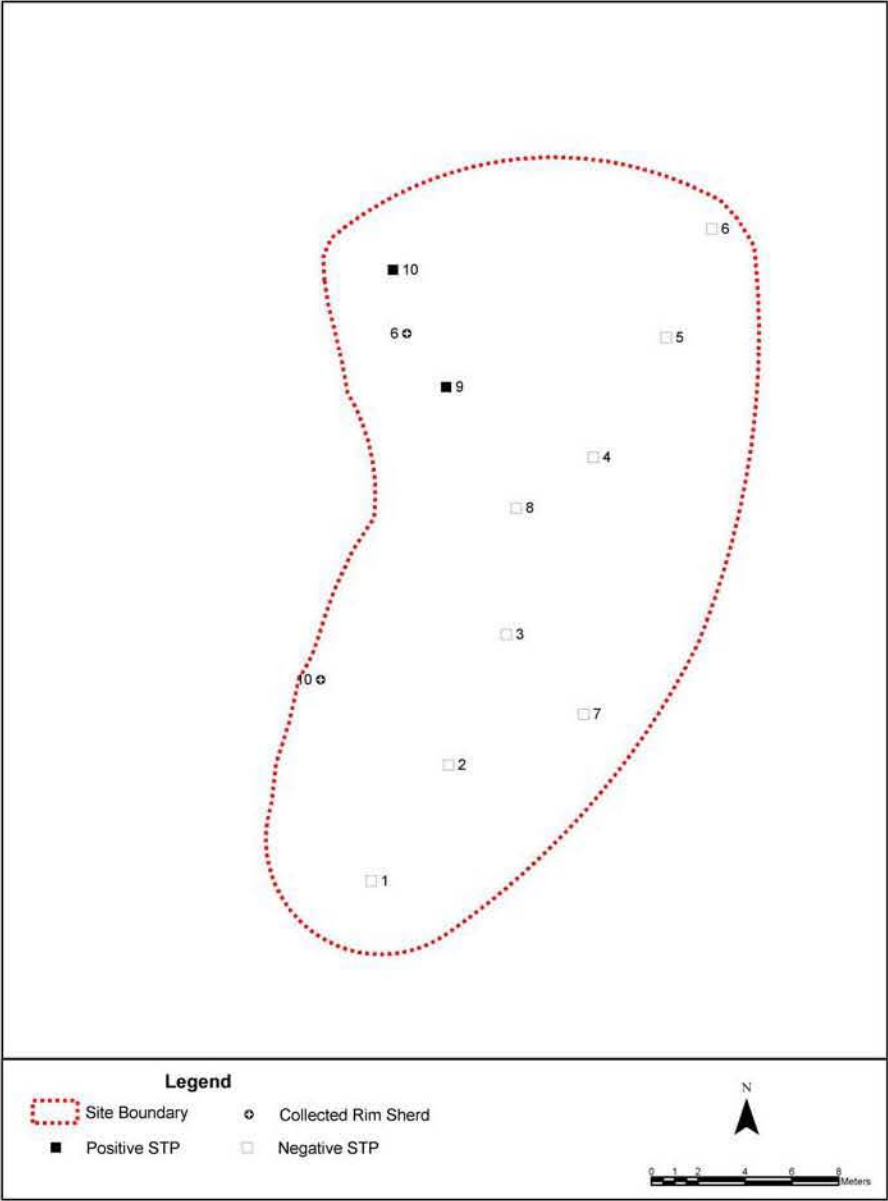
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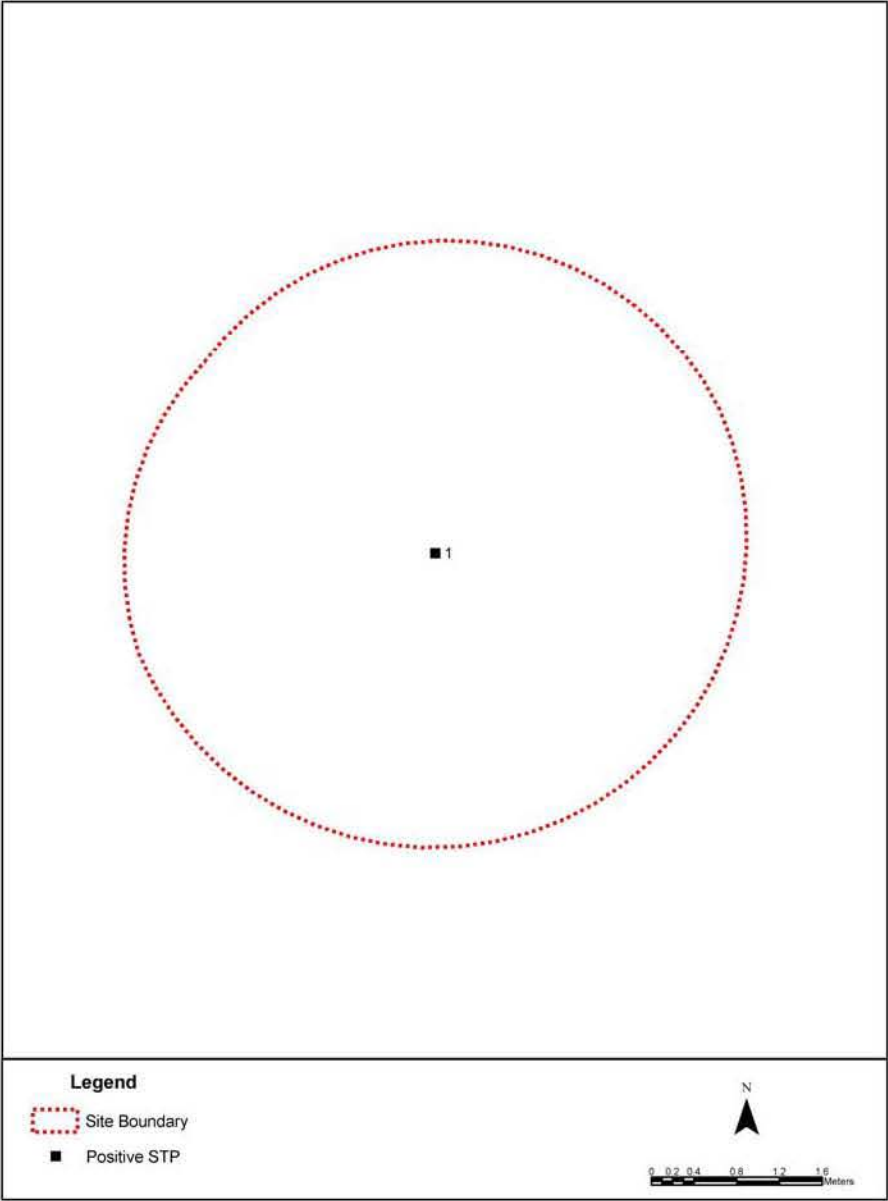
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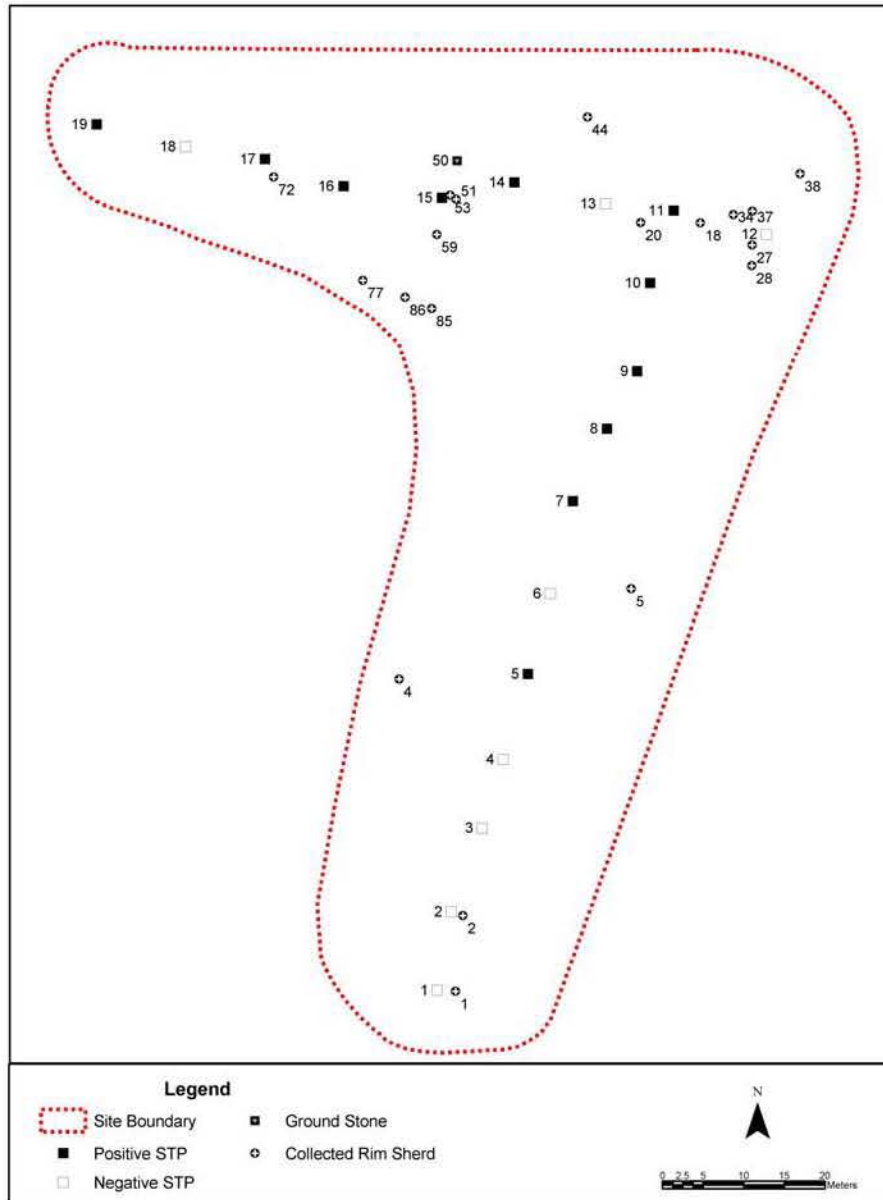
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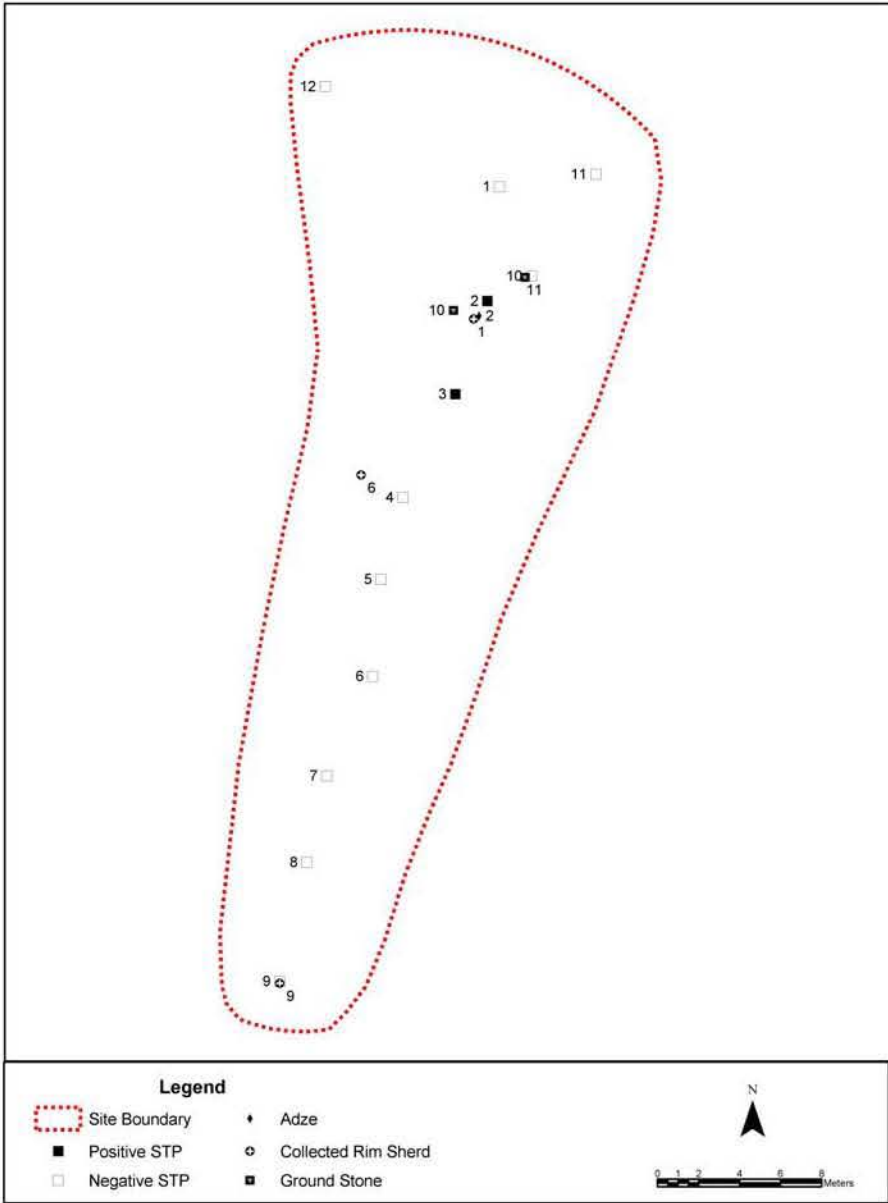
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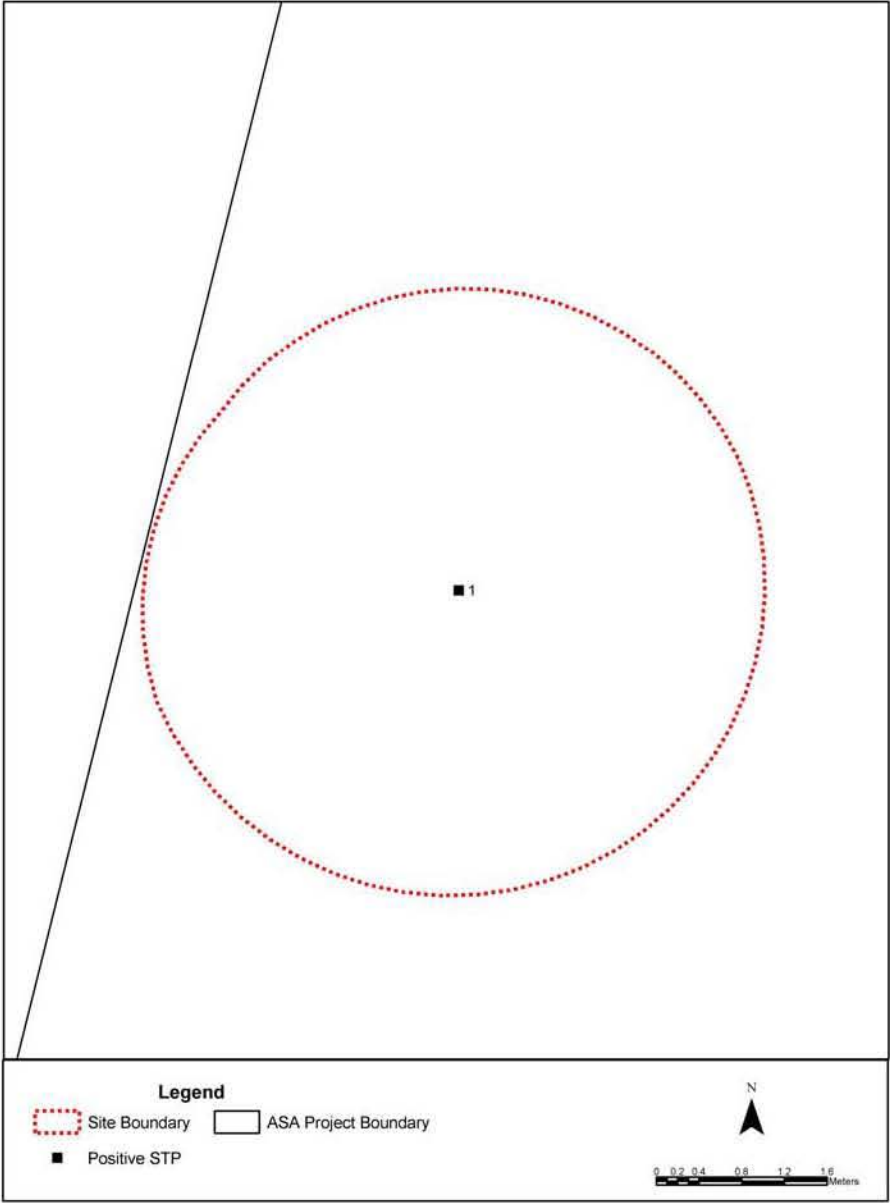
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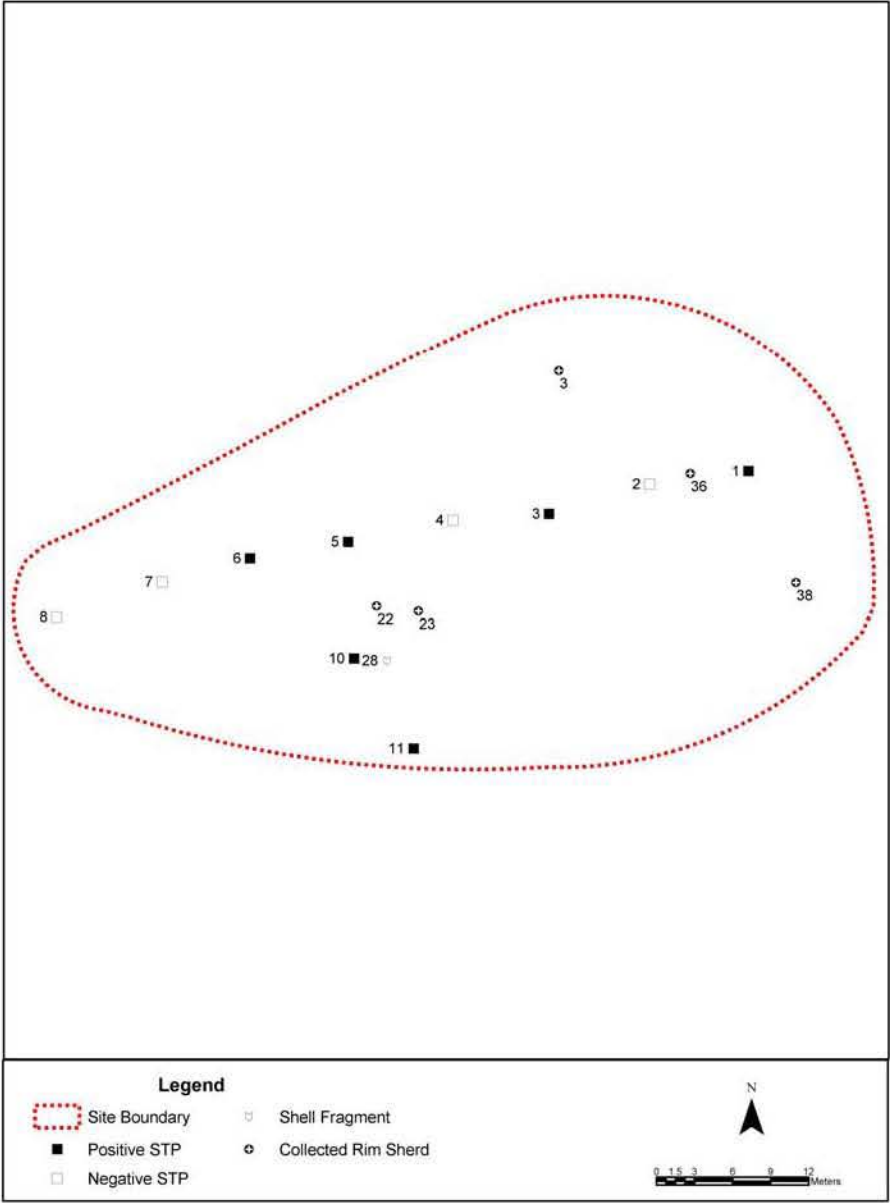


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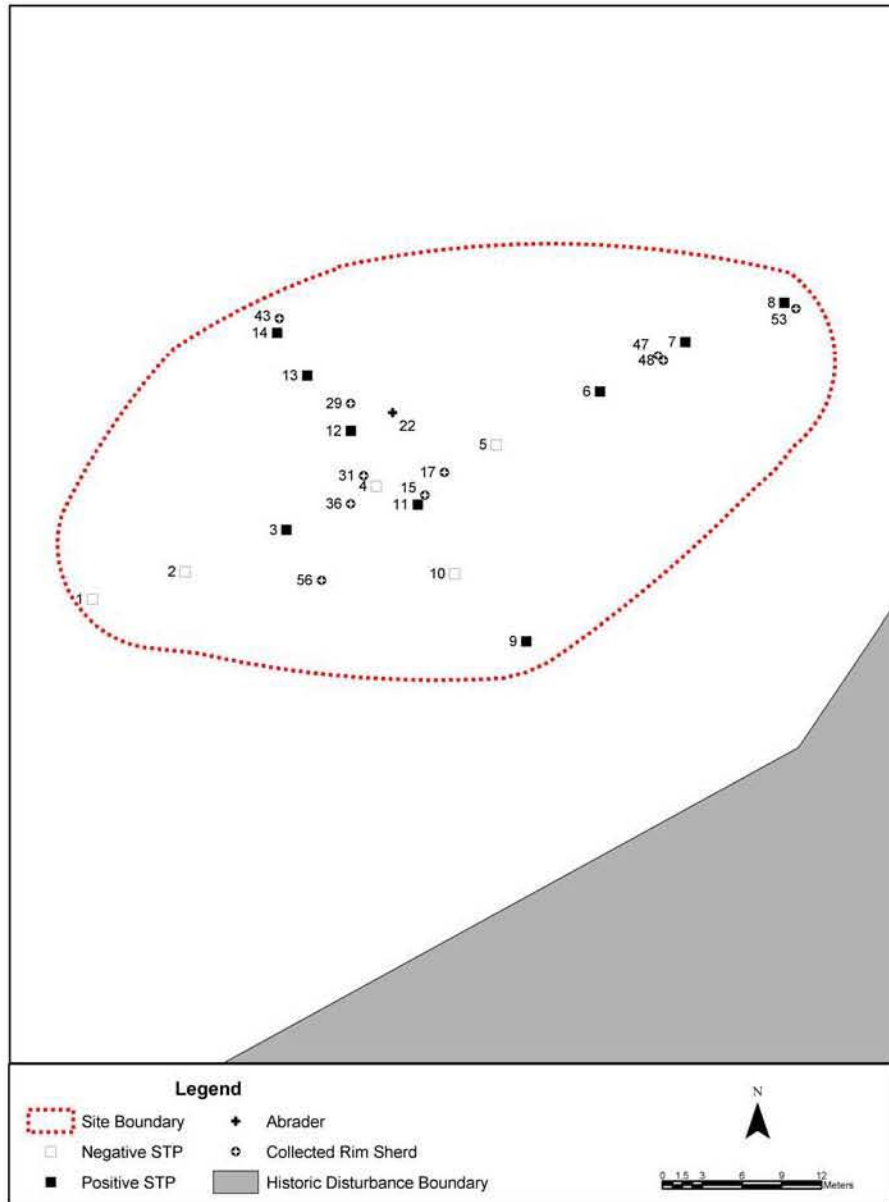


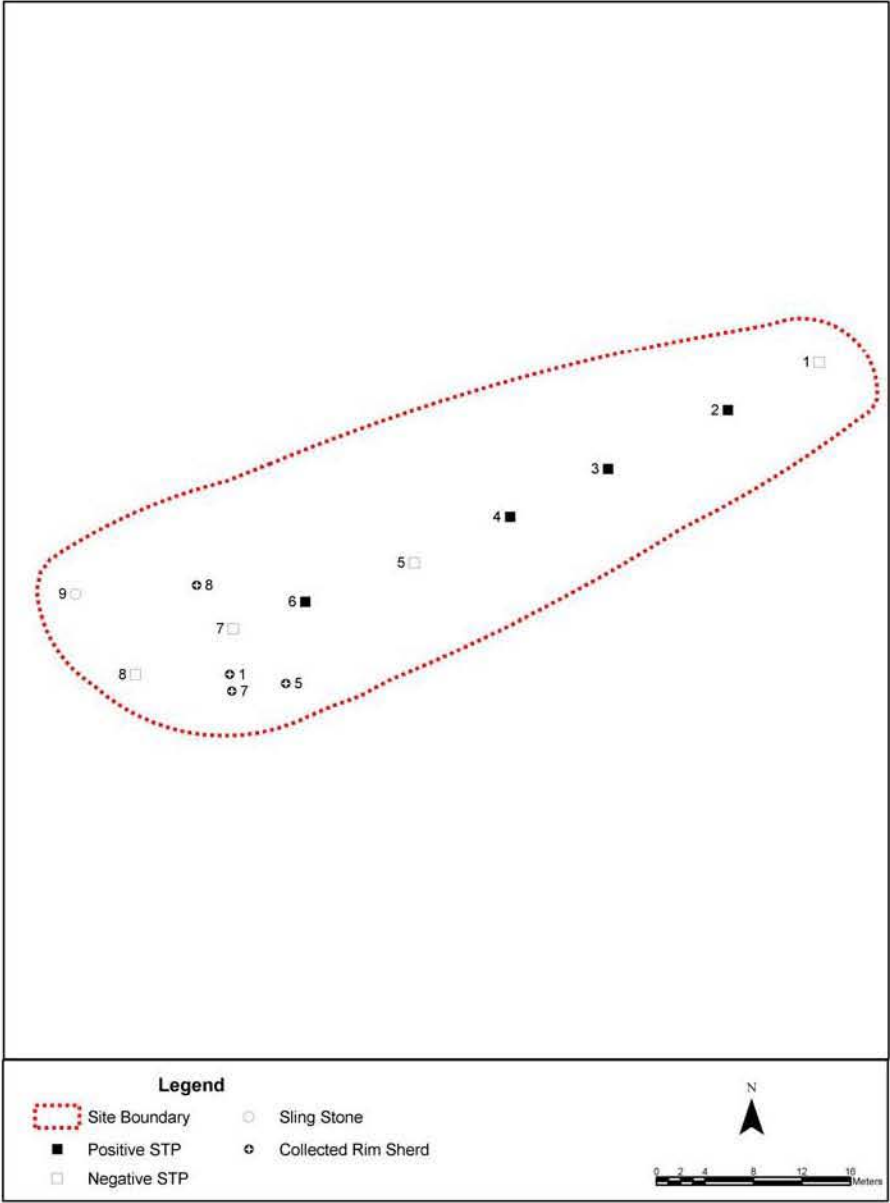
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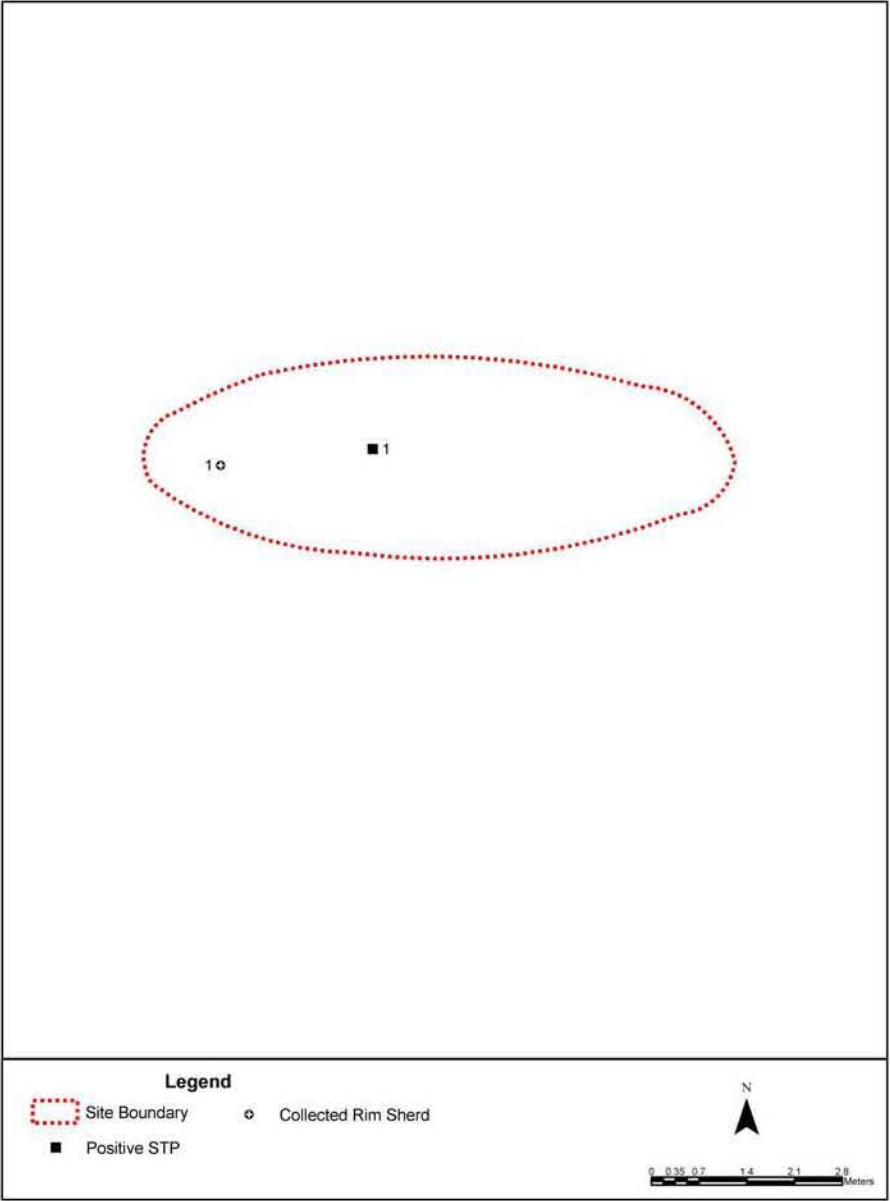




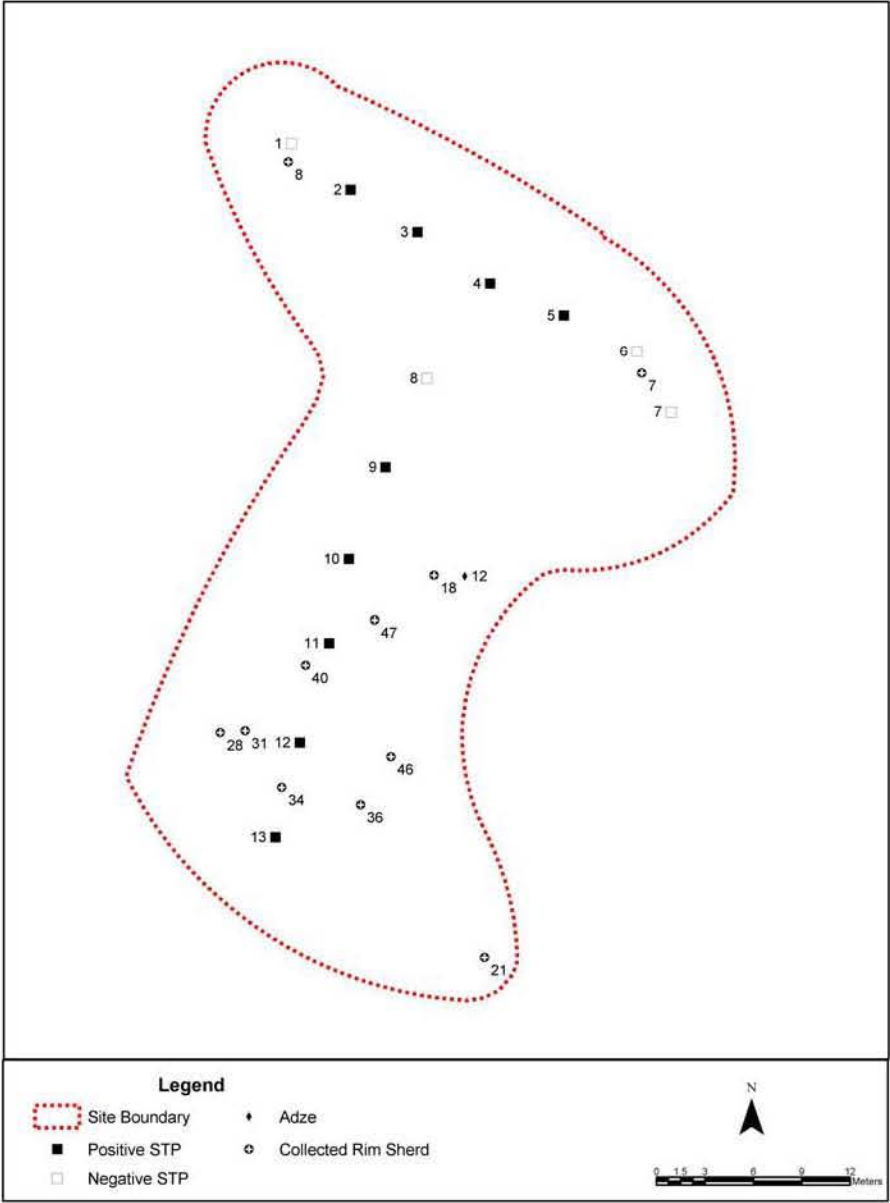
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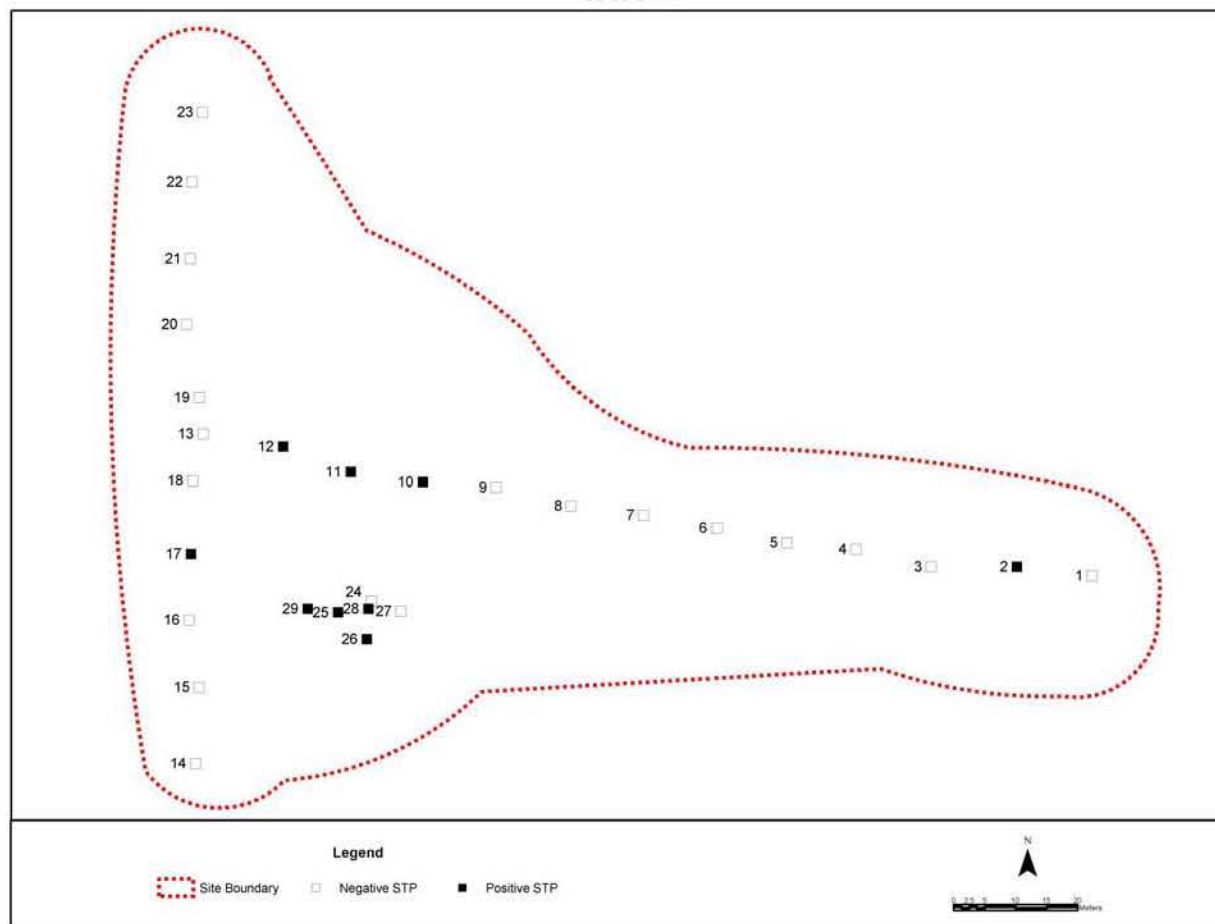




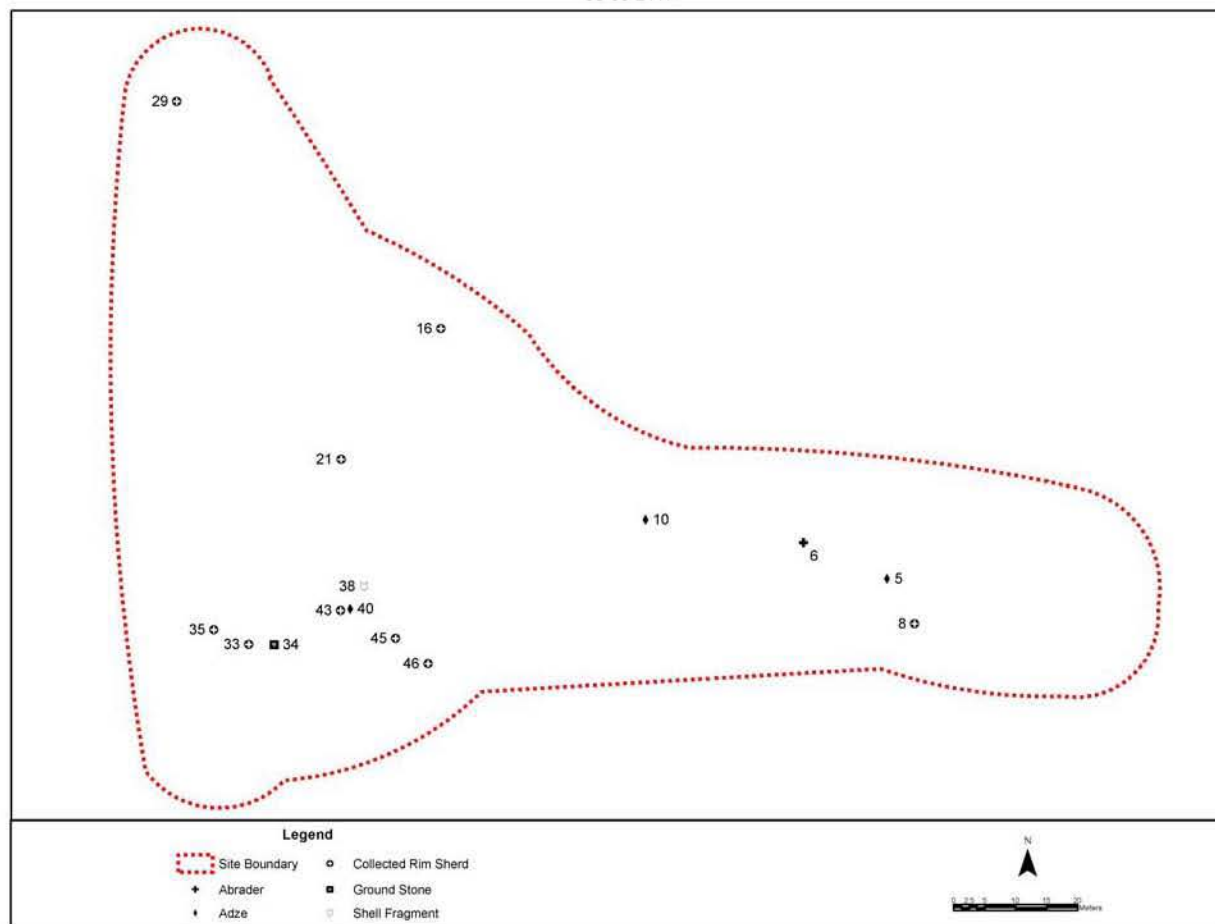
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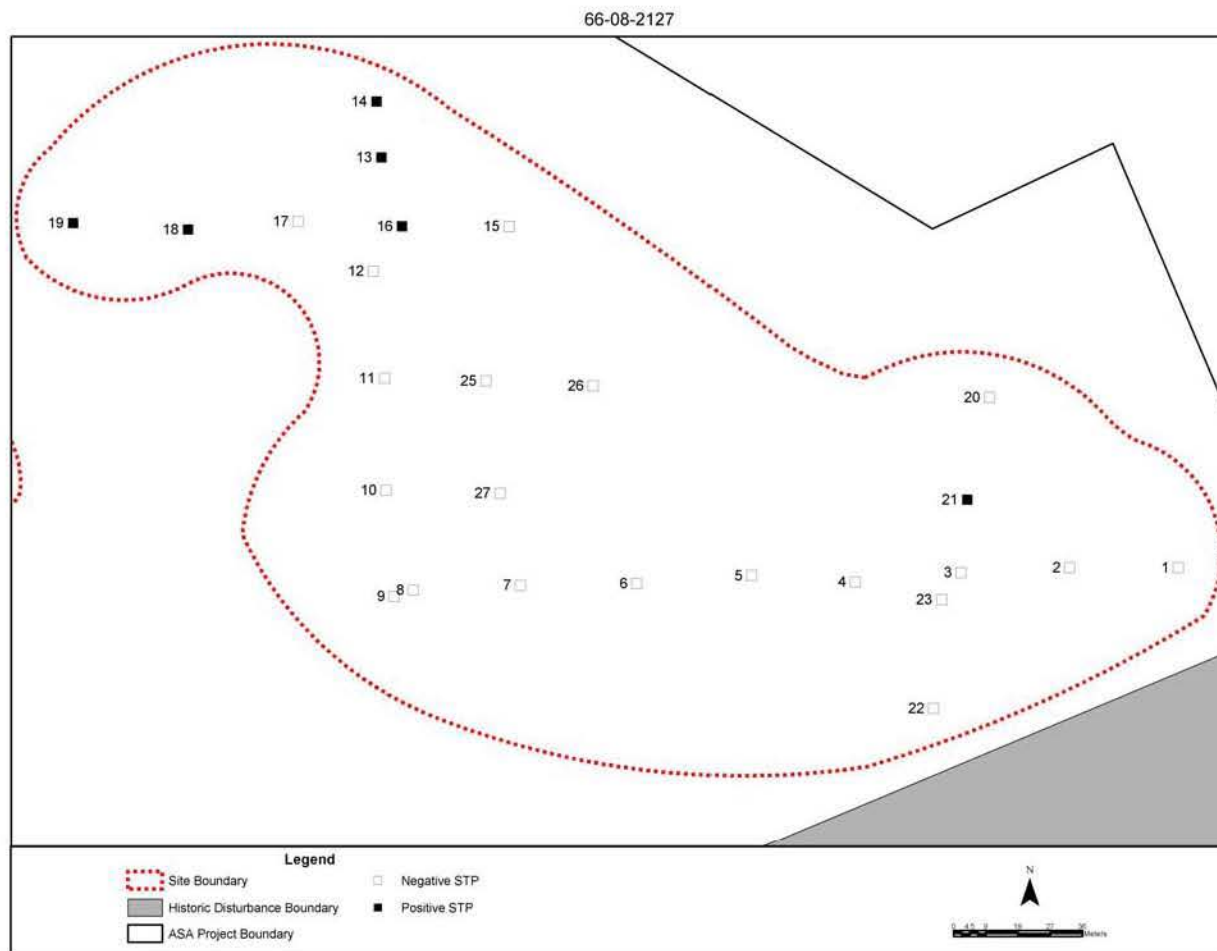


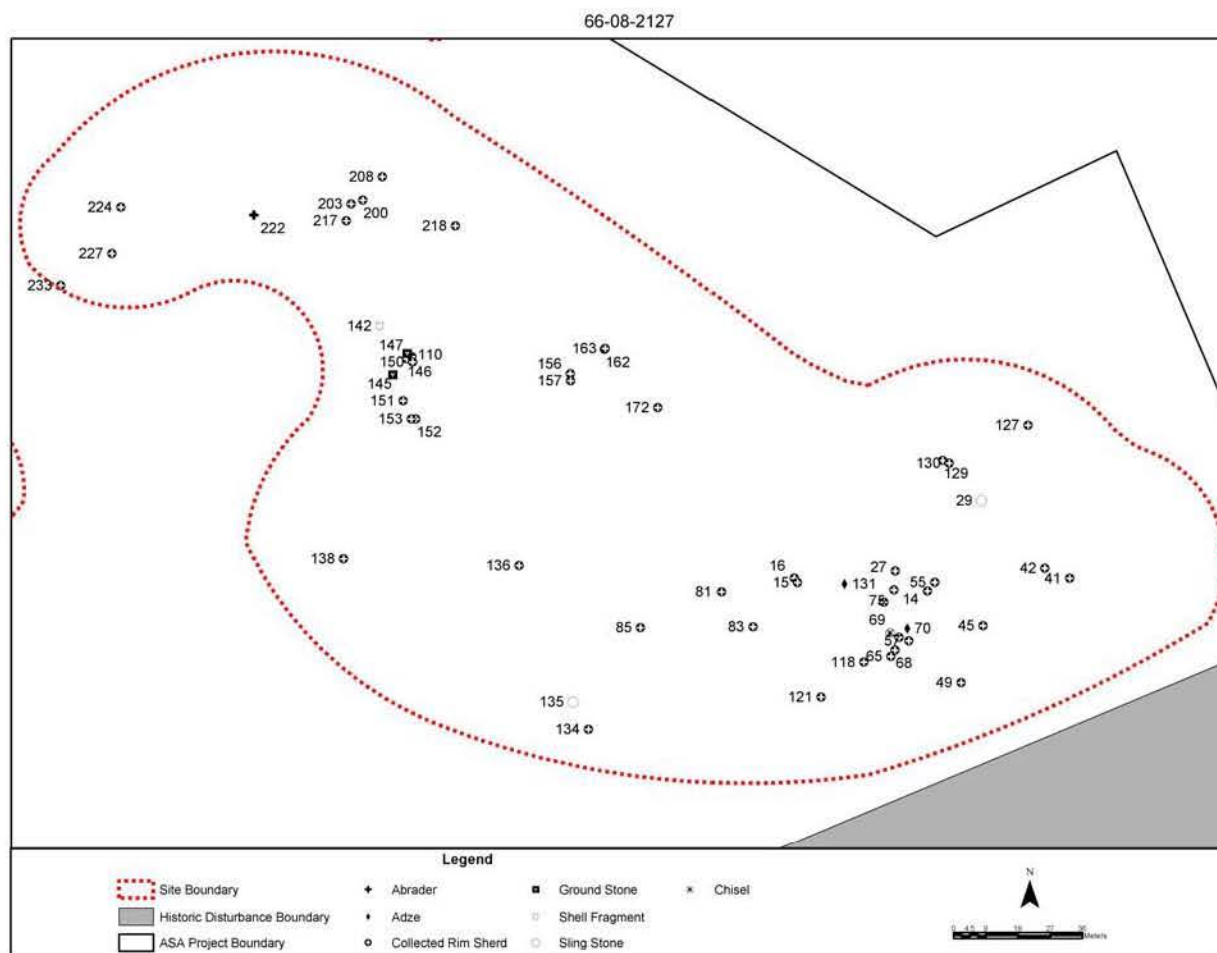
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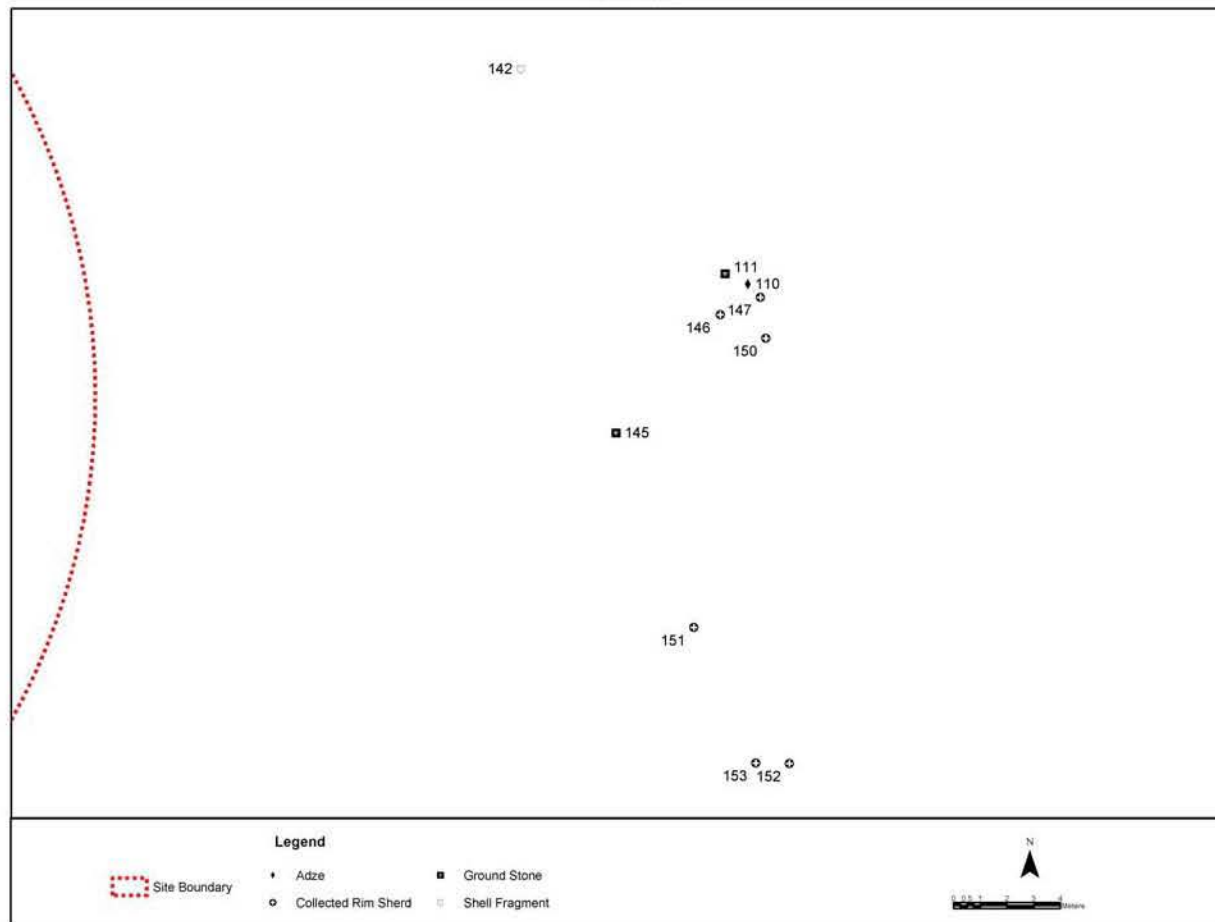
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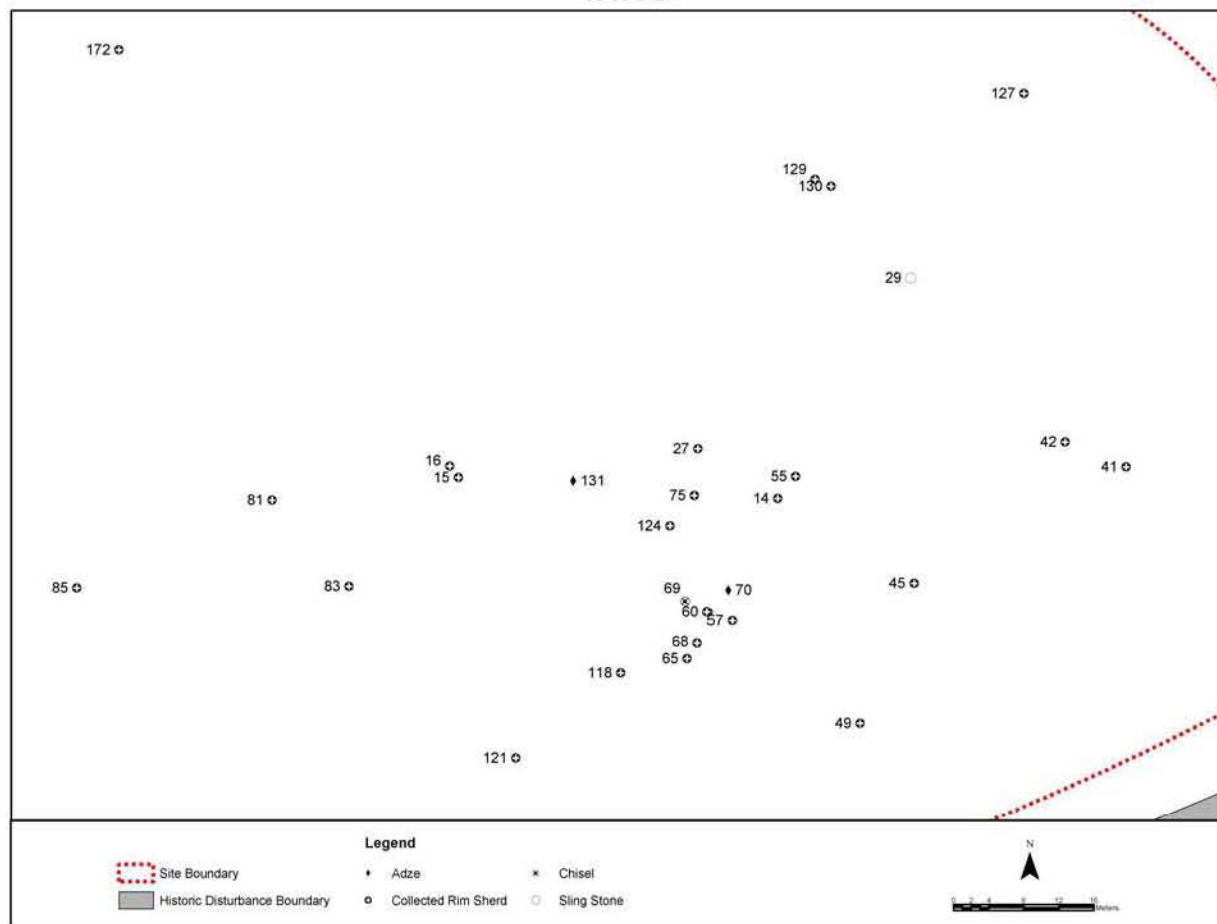




66-08-2127



66-08-2127



Appendix III: Prehistoric Artifact Catalog

Ground Stone Artifacts

Site No	Field Specimen No	Category	Material	Surfaces	Edges	Condition	Length	Width	Thickness	Collected	Unit Type	Unit No
66-08-2110	33	Adze	Basalt	Ground	Ground	Incomplete	31.4	20.8	8.4	1	STP	8
66-08-2113	14	Abrader	Limestone	Ground	Ground	Incomplete	104	86.2	68.3	1	NULL	NULL
66-08-2117	5	Adze	Limestone	NULL	NULL	Incomplete	48.2	36.5	15.4	1	General Surface	N/A
66-08-2117	6	Abrader	Basalt	Ground	Broken	Incomplete	66.4	47.2	32.5	1	General Surface	N/A
66-08-2117	10	Adze	Limestone	NULL	NULL	Incomplete	63	60.9	27.6	1	General Surface	N/A
66-08-2117	34	Metate	Basalt	Ground	Broken	Incomplete	27.8	24.7	15	1	General Surface	N/A
66-08-2117	40	Adze	Limestone	Ground	Flaked/Broken	Incomplete	37.2	27.6	5.9	1	General Surface	N/A
66-08-2117	77	Undetermined	Basalt	Ground/Broken	Broken	Incomplete	18.5	13	5.9	1	General Surface	N/A
66-08-2117	102	Undetermined	Basalt	Ground/Broken	Incomplete	Incomplete	37	26.6	19.4	1	General Surface	N/A
66-08-2118	50	Undetermined	Basalt	Ground	Ground	Incomplete	61.7	40	12.4	1	General Surface	N/A
66-08-2119	10	Metate	Basalt	Ground	Unmodified	Incomplete	106	98.5	50.5	1	General Surface	N/A
66-08-2119	11	Undetermined	Basalt	Ground	Unmodified	Incomplete	94.9	47	26.7	1	General Surface	N/A
66-08-2122	22	Abrader	Basalt	Ground	NULL	Incomplete	62.6	26.8	12.5	0	General Surface	N/A
66-08-2122	52	Undetermined	Basalt	Ground	Ground	Incomplete	66.2	52.7	15.7	1	General Surface	N/A
66-08-2126	12	Adze	Limestone	Pecked	Ground	Incomplete	57.6	44.3	12.9	1	General Surface	N/A
66-08-2127	66	Undetermined	Basalt	Ground	Broken	Incomplete	174	99.1	104.1	0	General Surface	N/A
66-08-2127	70	Adze	Andesite	NULL	Abraded/Flaked	Incomplete	55.8	44.9	10.3	1	General Surface	N/A
66-08-2127	111	Undetermined	Andesite	Ground	Broken	Incomplete	32.4	35.6	17	1	General Surface	N/A
66-08-2127	222	Abrader	Basalt	Ground	Broken	Incomplete	48.9	46.2	23.5	1	General Surface	N/A
66-08-2127	145	Pestle	Andesite	Ground	Ground	Incomplete	89.9	33.4	26.8	1	General Surface	N/A
66-08-2127	131	Adze	Basalt	NULL	NULL	Incomplete	60.5	22.9	9.6	1	General Surface	N/A

Lithic Artifacts

Site No	Field Specimen No	Category	Type	Material	Condition	Length	Width	Thickness	Collected	Unit Type	Unit No
66-08-2117	99	Core	Unidirectional	Basalt	Incomplete	38.8	34.5	21	1	General Surface	N/A
66-08-2117	100	Flake	Primary	Basalt	Incomplete	29.2	17.8	11.6	1	General Surface	N/A
66-08-2117	101	Core	Random	Basalt	Incomplete	34.3	25	20.3	1	General Surface	N/A
66-08-2117	105	Flake	Primary	Basalt	Complete	31.1	30.7	8.4	1	General Surface	N/A
66-08-2127	29	Sling stone	N/A	Limestone	Complete	45.9	32.3	30	1	General Surface	N/A
66-08-2127	69	Chisel	N/A	Andesite	Incomplete	58	32.2	28	1	General Surface	N/A
66-08-2127	92	Sling stone	N/A	Limestone	Complete	51.4	32.8	27.8	1	STP	14
66-08-2127	135	Sling stone	N/A	Limestone	Incomplete	68.1	55.9	52.5	1	General Surface	N/A

Shell Artifacts

Site No	Field Specimen No	Category	Type	Surfaces	Edges	Condition	Length	Width	Thickness	Collected	Unit Type	Unit No
66-08-2117	9	Adze	Tridacna	Abraded	Abraded	Incomplete	43.8	31.4	5.6	1	General Surface	N/A
66-08-2117	38	Unaltered	Tridacna	Unaltered	Unaltered	Incomplete	47	40	11.4	1	General Surface	N/A
66-08-2117	72	Unaltered	Other Bivalve	Unaltered	Broken	Incomplete	38.8	26.1	2.2	1	General Surface	N/A
66-08-2117	75	Unaltered	Other Gastropod	Unaltered	Unaltered	Complete	21.4	18.6	8	1	General Surface	N/A
66-08-2117	76	Unaltered	Other Gastropod	Unaltered	Unaltered	Incomplete	23.6	22.4	8	1	General Surface	N/A
66-08-2117	78	Unaltered	Other Gastropod	Unaltered	Broken	Incomplete	46.9	33.1	10.3	1	General Surface	N/A
66-08-2117	79	Unaltered	Other Gastropod	Unaltered	Broken	Incomplete	38.4	17.6	6.4	1	General Surface	N/A
66-08-2117	80	Unaltered	Other Bivalve	Unaltered	Broken	Incomplete	25.2	20.9	1	1	General Surface	N/A
66-08-2117	81	Unaltered	Other Bivalve	Unaltered	Broken	Incomplete	19.9	18.9	0.7	1	General Surface	N/A
66-08-2117	104	Unaltered	Other Gastropod	Unaltered	Unaltered	Incomplete	27.2	19.4	2.7	1	General Surface	N/A
66-08-2117	106	Unaltered	Other Bivalve	Unaltered	Broken	Incomplete	30.8	29.2	2.2	1	General Surface	N/A
66-08-2117	107	Unaltered	Other Bivalve	Unaltered	Broken	Incomplete	30.5	20.8	1.9	1	General Surface	N/A
66-08-2117	108	Unaltered	Other Gastropod	Unaltered	Unaltered	Complete	21.8	18.4	7.7	1	General Surface	N/A
66-08-2117	113	Adze	Tridacna	Abraded	Abraded	Complete	71.7	37.7	10.2	1	General Surface	N/A
66-08-2117	115	Unaltered	Undetermined	Unaltered	Broken	Incomplete	24.3	13.7	0.9	1	General Surface	N/A
66-08-2117	116	Unaltered	Undetermined	Unaltered	Broken	Incomplete	31.3	20.4	2.5	1	General Surface	N/A
66-08-2118	117	Adze	Tridacna	Abraded	Worn	Incomplete	32.1	33.5	4.1	1	STP	19
66-08-2119	2	Adze	Tridacna	Abraded	Abraded	Complete	75.7	41.3	9.5	1	General Surface	N/A
66-08-2121	28	Unaltered	Undetermined	Unaltered	Unaltered	Incomplete	47	35.8	19.4	0	General Surface	N/A
66-08-2127	110	Adze	Tridacna	Abraded	Abraded	Complete	61.8	38.1	9.9	1	General Surface	N/A
66-08-2127	142	Unaltered	Tridacna	Weathered	Abraded	Incomplete	34.6	20.8	3.5	1	General Surface	N/A

Coral Artifacts

Site No	Field Specimen No	Category	Material	Surfaces	Condition	Length	Width	Thickness	Collected	UnitType
66-08-2123	9	Slingstone	Coral	Abraded	Complete	46.4	31.1	31.6	1	General Surface

Ceramic Artifacts

Site No	Field Specimen No	Sherd Type	Exterior Treatment	Interior Treatment	Temper	Width	Thickness	Collected	Unit Type	Unit No
66-08-2109	1	Body	Smooth	Smooth	Calcareous	37.3	10.8	0	General Surface	N/A
66-08-2109	2	B NOS	Smooth	Indeterminate	Calcareous	35.5	18	1	General Surface	N/A
66-08-2109	3	B NOS	Smooth	Smooth	Calcareous	25.3	14.6	1	General Surface	N/A
66-08-2109	4	B NOS	Smooth	Indeterminate	Calcareous	33.3	16.9	1	General Surface	N/A
66-08-2109	6	Body	Smooth	Smooth	Calcareous	29.4	12	0	General Surface	N/A
66-08-2109	7	B NOS	Smooth	Smooth	Calcareous	18.7	13.8	1	General Surface	N/A
66-08-2109	8	Body	Smooth	Smooth	Calcareous	24.8	11.3	0	General Surface	N/A
66-08-2109	9	Body	Smooth	Smooth	Calcareous	27.3	11	0	General Surface	N/A
66-08-2109	10	Body	Smooth	Smooth	Calcareous	11.2	8.5	0	General Surface	N/A
66-08-2109	11	Body	Smooth	Indeterminate	Calcareous	13.9	9.5	0	General Surface	N/A
66-08-2109	12	Body	Smooth	Smooth	Calcareous	34.8	11.2	0	General Surface	N/A
66-08-2109	13	B NOS	Indeterminate	Smooth	Calcareous	64.6	17.4	1	General Surface	N/A
66-08-2109	14	Body	Smooth	Smooth	Calcareous	21.9	8.6	0	General Surface	N/A
66-08-2109	15	Body	Smooth	Smooth	Calcareous	20.8	9.8	0	General Surface	N/A
66-08-2109	16	B NOS	Smooth	Smooth	Volcanic	42	15.6	1	General Surface	N/A
66-08-2109	17	B NOS	Smooth	Other	Mixed	72.8	13.9	1	General Surface	N/A
66-08-2109	18	Body	Indeterminate	Other	Calcareous	11.3	7.3	0	General Surface	N/A
66-08-2109	19	Body	Smooth	Smooth	Calcareous	21.4	12.1	0	General Surface	N/A
66-08-2109	20	Body	Punctate	Smooth	Calcareous	8.7	7.3	0	General Surface	N/A
66-08-2109	21	Body	Smooth	Smooth	Calcareous	36.4	8.7	0	General Surface	N/A
66-08-2109	22	Body	Smooth	Smooth	Calcareous	17.9	8.7	0	General Surface	N/A
66-08-2109	23	Body	Other	Smooth	Indeterminate	29.7	10	1	STP	8
66-08-2109	24	Body	Other	Smooth	Indeterminate	27.1	8.7	1	STP	8
66-08-2109	25	Body	Other	Smooth	Indeterminate	26.8	12.5	1	STP	8
66-08-2109	26	Body	Smooth	Smooth	Indeterminate	22.8	8.1	1	STP	8
66-08-2109	27	Body	Indeterminate	Indeterminate	Indeterminate	12.9	6.8	1	STP	8
66-08-2109	28	Body	Indeterminate	Indeterminate	Indeterminate	12.8	9.3	1	STP	8
66-08-2109	29	Body	Indeterminate	Indeterminate	Indeterminate	17.3	9.4	1	STP	8
66-08-2109	30	Body	Indeterminate	Indeterminate	Indeterminate	18.1	5.9	1	STP	8
66-08-2109	31	Body	Indeterminate	Indeterminate	Indeterminate	15.2	7.1	1	STP	8
66-08-2109	32	Body	Smooth	Smooth	Calcareous	20.5	4.2	1	STP	8

66-08-2109	33	Body	Other	Smooth	Calcareous	53	12.8	1	STP	2
66-08-2109	34	Body	Smooth	Other	Calcareous	37.6	11.6	0	General Surface	N/A
66-08-2109	35	Body	Smooth	Other	Calcareous	41.1	12	0	General Surface	N/A
66-08-2109	36	Body	Smooth	Other	Calcareous	32.2	10.6	0	General Surface	N/A
66-08-2109	37	Body	Smooth	Other	Calcareous	18	10.4	0	General Surface	N/A
66-08-2109	38	Body	Smooth	Smooth	Calcareous	26.2	8.3	1	STP	6
66-08-2109	39	Body	Smooth	Smooth	Calcareous	38.3	9.4	1	STP	6
66-08-2109	40	Body	Smooth	Smooth	Indeterminate	32.6	10.1	1	STP	7
66-08-2109	41	Body	Smooth	Smooth	Indeterminate	29.9	9	1	STP	7
66-08-2109	42	Body	Smooth	Indeterminate	Indeterminate	28.5	10.4	1	STP	7
66-08-2109	43	Body	Smooth	Smooth	Indeterminate	34.1	8.2	1	STP	7
66-08-2110	1	Body	Smooth	Indeterminate	Calcareous	22.6	12.9	0	General Surface	N/A
66-08-2110	2	Body	Smooth	Indeterminate	Calcareous	14.6	9	0	General Surface	N/A
66-08-2110	3	Body	Smooth	Smooth	Calcareous	20.6	13.7	0	General Surface	N/A
66-08-2110	4	Body	Smooth	Smooth	Calcareous	45.8	18.9	0	General Surface	N/A
66-08-2110	5	B NOS	Smooth	Smooth	Calcareous	38.8	18.1	1	General Surface	N/A
66-08-2110	6	Body	Smooth	Smooth	Calcareous	22.6	8.1	0	General Surface	N/A
66-08-2110	7	Body	Smooth	Smooth	Calcareous	25.9	8.9	0	General Surface	N/A
66-08-2110	8	Body	Indeterminate	Smooth	Indeterminate	30.4	12	0	General Surface	N/A
66-08-2110	9	Body	Smooth	Smooth	Indeterminate	43.9	14.3	0	General Surface	N/A
66-08-2110	10	B NOS	Indeterminate	Indeterminate	Indeterminate	21.7	18.9	1	General Surface	N/A
66-08-2110	11	Body	Smooth	Smooth	Indeterminate	29.1	9.4	0	General Surface	N/A
66-08-2110	12	Body	Smooth	Smooth	Indeterminate	22.5	8.5	0	General Surface	N/A
66-08-2110	13	Body	Smooth	Smooth	Indeterminate	21.1	10.5	0	General Surface	N/A
66-08-2110	14	Body	Indeterminate	Smooth	Indeterminate	16.5	10.7	0	General Surface	N/A
66-08-2110	15	Body	Indeterminate	Smooth	Indeterminate	38.2	17.2	0	General Surface	N/A
66-08-2110	16	Body	Smooth	Smooth	Calcareous	28.2	13.8	0	General Surface	N/A
66-08-2110	17	Body	Indeterminate	Smooth	Calcareous	22	12.3	0	General Surface	N/A
66-08-2110	18	Body	Smooth	Smooth	Calcareous	16.6	8.8	0	General Surface	N/A
66-08-2110	19	Body	Smooth	Smooth	Calcareous	33.2	9.5	0	General Surface	N/A
66-08-2110	20	B NOS	Other	Smooth	Calcareous	25.8	15.2	1	General Surface	N/A
66-08-2110	21	B NOS	Smooth	Smooth	Indeterminate	23.6	18.7	1	General Surface	N/A
66-08-2110	22	B NOS	Smooth	Smooth	Indeterminate	50.2	19.4	1	General Surface	N/A
66-08-2110	23	Body	Indeterminate	Smooth	Indeterminate	17.8	16.6	0	General Surface	N/A

66-08-2110	24	Body	Smooth	Smooth	Indeterminate	32	11.5	0	General Surface	N/A
66-08-2110	25	Body	Smooth	Smooth	Calcareous	24.9	6.8	1	STP	2
66-08-2110	26	Body	Smooth	Smooth	Calcareous	20.8	8.8	1	STP	2
66-08-2110	27	Body	Indeterminate	Smooth	Calcareous	21.7	10.1	1	STP	2
66-08-2110	28	Body	Scraped	Smooth	Calcareous	43.9	13.6	1	STP	2
66-08-2110	29	A NOS	Smooth	Smooth	Calcareous	42.9	10.3	1	STP	2
66-08-2110	30	Body	Indeterminate	Smooth	Calcareous	17.2	7.1	1	STP	4
66-08-2110	31	Body	Indeterminate	Smooth	Calcareous	25.9	11.5	1	STP	5
66-08-2110	32	B NOS	Smooth	Indeterminate	Indeterminate	16.6	15.8	1	STP	6
66-08-2110	34	Body	Indeterminate	Smooth	Calcareous	13.2	4.1	1	STP	11
66-08-2110	35	Body	Indeterminate	Smooth	Calcareous	13.1	4.7	1	STP	11
66-08-2110	36	Body	Indeterminate	Smooth	Indeterminate	10.3	8.1	1	STP	11
66-08-2110	37	Body	Smooth	Smooth	Indeterminate	9.6	7.6	1	STP	11
66-08-2110	38	Body	Smooth	Smooth	Indeterminate	19.2	10.2	1	STP	11
66-08-2110	39	Body	Smooth	Smooth	Indeterminate	11.7	5.5	1	STP	11
66-08-2110	40	Body	Smooth	Smooth	Calcareous	18.6	6.4	1	STP	11
66-08-2110	41	Body	Smooth	Smooth	Calcareous	9.3	5.1	1	STP	11
66-08-2110	42	B NOS	Smooth	Smooth	Calcareous	28.9	14.8	1	STP	11
66-08-2111	1	Body	Indeterminate	Indeterminate	Indeterminate	14.8	11.6	0	General Surface	N/A
66-08-2111	2	B NOS	Other	Smooth	Indeterminate	28.4	13.5	1	General Surface	N/A
66-08-2111	3	Body	Smooth	Smooth	Indeterminate	27.7	8.9	0	General Surface	N/A
66-08-2111	4	Body	Smooth	Smooth	Indeterminate	20	13.4	0	General Surface	N/A
66-08-2111	5	Body	Smooth	Smooth	Indeterminate	32.6	12.7	0	General Surface	N/A
66-08-2111	7	B NOS	Other	Other	Indeterminate	28.3	17.2	1	General Surface	N/A
66-08-2111	8	Body	Smooth	Smooth	Calcareous	17	7.7	1	STP	1
66-08-2111	9	Body	Smooth	Smooth	Calcareous	20.5	8.3	1	STP	1
66-08-2111	10	Body	Smooth	Smooth	Indeterminate	14.7	8.6	1	STP	1
66-08-2111	11	Body	Other	Smooth	Indeterminate	23.5	11.8	1	STP	1
66-08-2111	12	Body	Indeterminate	Smooth	Calcareous	21.1	8.1	1	STP	2
66-08-2111	13	Body	Smooth	Smooth	Indeterminate	19.2	9.2	1	STP	2
66-08-2112	1	B NOS	Scraped	Smooth	Mixed	49.9	15	1	General Surface	N/A
66-08-2112	2	Body	Smooth	Smooth	Calcareous	20.1	7.3	1	STP	1
66-08-2112	3	Body	Smooth	Smooth	Calcareous	17.7	7.6	1	STP	1
66-08-2112	4	Body	Smooth	Indeterminate	Calcareous	17.3	7.7	1	STP	1

66-08-2112	5	Body	Indeterminate	Smooth	Calcareous	13	5.5	1	STP	1
66-08-2112	6	Body	Smooth	Smooth	Calcareous	34.1	8.3	1	STP	1
66-08-2112	7	Body	Smooth	Smooth	Calcareous	15.7	15.3	1	STP	1
66-08-2112	8	Body	Smooth	Smooth	Calcareous	21.1	15.8	1	STP	1
66-08-2112	9	Body	Smooth	Indeterminate	Indeterminate	12.2	6.4	1	STP	1
66-08-2112	10	Body	Smooth	Smooth	Indeterminate	10.3	6.2	1	STP	1
66-08-2112	11	Body	Smooth	Smooth	Indeterminate	17.4	8.5	1	STP	1
66-08-2112	12	Body	Smooth	Indeterminate	Calcareous	17.3	12.6	1	STP	1
66-08-2112	13	A NOS	Smooth	Smooth	Indeterminate	23.7	6.4	1	STP	1
66-08-2112	14	B NOS	Smooth	Smooth	Calcareous	19.9	12.8	1	STP	1
66-08-2112	15	A NOS	Smooth	Smooth	Indeterminate	18.8	7.4	1	STP	1
66-08-2112	16	A NOS	Smooth	Smooth	Indeterminate	15.8	5.5	1	STP	1
66-08-2112	17	Body	Smooth	Smooth	Calcareous	19	8.7	0	General Surface	N/A
66-08-2112	18	Body	Indeterminate	Smooth	Calcareous	12.3	9.4	1	STP	2
66-08-2113	1	Body	Smooth	Smooth	Calcareous	38.2	14.1	0	General Surface	N/A
66-08-2113	2	Body	Smooth	Smooth	Calcareous	35.6	8.7	0	General Surface	N/A
66-08-2113	3	B NOS	Smooth	Smooth	Calcareous	44.6	13.8	1	General Surface	N/A
66-08-2113	4	Body	Smooth	Smooth	Calcareous	38	12.2	0	General Surface	N/A
66-08-2113	5	Body	Smooth	Smooth	Calcareous	20.5	10.4	0	General Surface	N/A
66-08-2113	6	Body	Indeterminate	Smooth	Calcareous	9.5	8.7	0	General Surface	N/A
66-08-2113	7	Body	Indeterminate	Smooth	Calcareous	17.9	10.3	0	General Surface	N/A
66-08-2113	8	Body	Smooth	Smooth	Indeterminate	19.3	9.8	0	General Surface	N/A
66-08-2113	9	Body	Smooth	Smooth	Indeterminate	15.1	4.6	0	General Surface	N/A
66-08-2113	10	Body	Smooth	Smooth	Indeterminate	14.7	8.6	0	General Surface	N/A
66-08-2113	11	Body	Smooth	Smooth	Indeterminate	13	10	0	General Surface	N/A
66-08-2113	12	Body	Smooth	Smooth	Indeterminate	27.2	12.3	0	General Surface	N/A
66-08-2113	13	Body	Smooth	Smooth	Indeterminate	23.7	11.9	0	General Surface	N/A
66-08-2113	16	Body	Smooth	Smooth	Calcareous	29.5	8.3	0	General Surface	N/A
66-08-2113	17	B NOS	Smooth	Smooth	Mixed	38.3	13.3	1	General Surface	N/A
66-08-2113	18	Body	Smooth	Smooth	Indeterminate	12.5	9.3	0	General Surface	N/A
66-08-2113	19	Body	Scraped	Smooth	Indeterminate	23.1	8.4	0	General Surface	N/A
66-08-2113	20	Body	Indeterminate	Smooth	Calcareous	32.7	16.2	0	General Surface	N/A
66-08-2113	21	Body	Smooth	Smooth	Calcareous	13	6.2	0	General Surface	N/A
66-08-2113	22	B NOS	Smooth	Smooth	Calcareous	24.5	15.1	1	General Surface	N/A

66-08-2113	23	Body	Smooth	Smooth	Indeterminate	26.3	12.5	0	General Surface	N/A
66-08-2113	24	Body	Smooth	Smooth	Indeterminate	30.2	9.8	0	General Surface	N/A
66-08-2113	25	Body	Smooth	Smooth	Indeterminate	29.4	14.5	0	General Surface	N/A
66-08-2113	26	B NOS	Combed	Smooth	Mixed	27.6	22.5	1	General Surface	N/A
66-08-2113	27	Body	Smooth	Smooth	Indeterminate	25.4	15.3	0	General Surface	N/A
66-08-2113	28	B NOS	Smooth	Smooth	Calcareous	36.8	15.2	1	General Surface	N/A
66-08-2113	29	Body	Smooth	Smooth	Indeterminate	30.1	9.2	0	General Surface	N/A
66-08-2113	30	Body	Cross-combed	Smooth	Mixed	55.7	10.3	1	General Surface	N/A
66-08-2113	31	Body	Smooth	Smooth	Calcareous	9.9	7.8	1	STP	3
66-08-2113	32	Body	Smooth	Smooth	Calcareous	18	9	1	STP	3
66-08-2113	33	Body	Smooth	Smooth	Calcareous	33	11.9	1	STP	3
66-08-2113	34	Body	Indeterminate	Smooth	Calcareous	18	7.8	1	STP	3
66-08-2113	35	Body	Smooth	Smooth	Calcareous	12.2	6.7	1	STP	3
66-08-2113	36	Body	Smooth	Smooth	Calcareous	26.2	7.1	1	STP	3
66-08-2113	37	Body	Smooth	Smooth	Calcareous	36.2	8.1	1	STP	4
66-08-2113	38	Body	Smooth	Smooth	Calcareous	28.8	10.4	1	STP	4
66-08-2113	39	Body	Smooth	Smooth	Calcareous	27.1	10.3	1	STP	4
66-08-2113	40	B NOS	Smooth	Smooth	Calcareous	44.6	12.8	1	STP	4
66-08-2113	41	B NOS	Combed (Intermittent)	Smooth	Calcareous	47.1	16.3	1	STP	4
66-08-2113	42	B NOS	Smooth	Smooth	Calcareous	32.1	15.7	1	STP	4
66-08-2113	44	Body	Smooth	Smooth	Calcareous	13.7	9.4	1	STP	6
66-08-2113	45	Body	Smooth	Smooth	Calcareous	11	9.2	1	STP	6
66-08-2113	46	Body	Smooth	Smooth	Calcareous	15.9	8	1	STP	7
66-08-2113	47	Body	Smooth	Smooth	Calcareous	18.9	12.6	1	STP	7
66-08-2113	48	Body	Smooth	Smooth	Calcareous	19.9	13.1	1	STP	9
66-08-2113	49	Body	Indeterminate	Smooth	Calcareous	16.8	5.8	1	STP	9
66-08-2113	50	Body	Indeterminate	Indeterminate	Indeterminate	16	5.4	1	STP	9
66-08-2113	51	Body	Smooth	Indeterminate	Indeterminate	19.1	8.9	1	STP	9
66-08-2113	52	Body	Smooth	Smooth	Indeterminate	9.6	9.5	1	STP	9
66-08-2113	53	Body	Smooth	Smooth	Calcareous	21.8	10.6	1	STP	9
66-08-2113	54	Body	Indeterminate	Smooth	Indeterminate	16.7	6.7	1	STP	9
66-08-2113	55	B NOS	Smooth	Indeterminate	Calcareous	19.9	14.8	1	STP	9
66-08-2113	56	Body	Smooth	Smooth	Indeterminate	9.1	7.6	1	STP	9
66-08-2113	57	Body	Smooth	Smooth	Calcareous	12.3	6.3	1	STP	9

66-08-2113	58	Body	Combed (Intermittent)	Smooth	Indeterminate	17.6	8	1	STP	9
66-08-2113	59	Body	Combed (Intermittent)	Smooth	Indeterminate	13.5	5.6	1	STP	9
66-08-2113	60	Body	Indeterminate	Smooth	Indeterminate	9.5	6.6	1	STP	9
66-08-2113	61	Body	Indeterminate	Smooth	Calcareous	5.7	5.2	1	STP	9
66-08-2113	62	Body	Indeterminate	Indeterminate	Indeterminate	6.1	4.5	1	STP	9
66-08-2113	63	Body	Smooth	Smooth	Calcareous	28.3	9.7	1	STP	11
66-08-2113	64	Body	Smooth	Smooth	Calcareous	24.4	12.1	1	STP	11
66-08-2113	65	Body	Indeterminate	Smooth	Calcareous	14.2	5.3	1	STP	11
66-08-2113	66	Body	Smooth	Smooth	Calcareous	16.9	8.6	1	STP	13
66-08-2113	67	Body	Smooth	Smooth	Calcareous	26.9	12.5	1	STP	14
66-08-2113	68	Body	Smooth	Smooth	Calcareous	17.6	9.8	1	STP	15
66-08-2113	69	Body	Smooth	Smooth	Calcareous	29.7	12.1	1	STP	15
66-08-2113	70	Body	Indeterminate	Indeterminate	Calcareous	29.4	12.4	1	STP	15
66-08-2113	71	Body	Smooth	Indeterminate	Calcareous	28.2	20.4	1	STP	17
66-08-2113	72	Body	Smooth	Smooth	Calcareous	28.8	6.8	1	STP	18
66-08-2113	73	Body	Smooth	Smooth	Calcareous	28.1	7.2	1	STP	18
66-08-2113	74	Body	Smooth	Smooth	Calcareous	26.2	8.4	1	STP	18
66-08-2113	75	Body	Indeterminate	Indeterminate	Calcareous	14.4	12.2	1	STP	18
66-08-2113	76	Body	Smooth	Smooth	Calcareous	16.3	7.7	1	STP	18
66-08-2113	77	Body	Smooth	Smooth	Calcareous	18.1	7	1	STP	18
66-08-2113	78	B NOS	Indeterminate	Smooth	Calcareous	13.4	21.1	1	STP	21
66-08-2114	1	B NOS	Smooth	Smooth	Calcareous	49.8	13.6	1	General Surface	N/A
66-08-2114	2	Body	Smooth	Smooth	Indeterminate	17.5	8	0	General Surface	N/A
66-08-2114	3	Body	Smooth	Smooth	Indeterminate	23.4	8.4	0	General Surface	N/A
66-08-2114	4	Body	Smooth	Smooth	Indeterminate	27.5	8.8	0	General Surface	N/A
66-08-2114	5	Body	Smooth	Smooth	Indeterminate	20.9	10.2	0	General Surface	N/A
66-08-2114	6	Body	Smooth	Smooth	Indeterminate	25.7	11.8	0	General Surface	N/A
66-08-2114	7	Body	Smooth	Smooth	Indeterminate	28.6	11.7	0	General Surface	N/A
66-08-2114	8	Body	Smooth	Smooth	Indeterminate	18.9	8.3	0	General Surface	N/A
66-08-2114	9	B NOS	Smooth	Smooth	Calcareous	40.4	16.4	1	General Surface	N/A
66-08-2114	10	Body	Smooth	Smooth	Calcareous	16.5	9	1	STP	1
66-08-2114	11	Body	Combed (Intermittent)	Smooth	Calcareous	18.4	8.7	1	STP	1
66-08-2115	1	Body	Smooth	Smooth	Indeterminate	33.8	8.2	0	General Surface	N/A
66-08-2115	2	Body	Smooth	Smooth	Calcareous	24.5	10.8	0	General Surface	N/A

66-08-2115	3	Body	Smooth	Smooth	Indeterminate	19.3	11	0	General Surface	N/A
66-08-2115	4	Body	Smooth	Smooth	Indeterminate	29.4	12.6	0	General Surface	N/A
66-08-2115	5	Body	Smooth	Smooth	Indeterminate	45.7	15.9	0	General Surface	N/A
66-08-2115	6	B NOS	Smooth	Smooth	Calcareous	22	16	1	General Surface	N/A
66-08-2115	7	Body	Smooth	Smooth	Indeterminate	21.2	9.2	0	General Surface	N/A
66-08-2115	8	Body	Smooth	Smooth	Indeterminate	17.8	8.2	0	General Surface	N/A
66-08-2115	9	Body	Smooth	Smooth	Indeterminate	34.4	9.8	0	General Surface	N/A
66-08-2115	10	B NOS	Smooth	Indeterminate	Calcareous	39.9	12.6	1	General Surface	N/A
66-08-2115	11	Body	Smooth	Smooth	Indeterminate	30.8	10.2	0	General Surface	N/A
66-08-2115	12	Body	Smooth	Smooth	Indeterminate	19.7	7.8	1	STP	9
66-08-2115	13	Body	Smooth	Smooth	Calcareous	19.3	10.1	1	STP	10
66-08-2115	14	Body	Smooth	Smooth	Calcareous	24.7	12.6	1	STP	10
66-08-2115	15	Body	Smooth	Smooth	Calcareous	18.2	10.6	1	STP	10
66-08-2115	16	Body	Smooth	Indeterminate	Calcareous	15.9	12.1	1	STP	10
66-08-2116	1	Body	Cross-combed	Smooth	Indeterminate	22.8	6.4	0	General Surface	N/A
66-08-2116	2	Body	Smooth	Smooth	Calcareous	16.8	6.3	0	General Surface	N/A
66-08-2116	3	Body	Smooth	Smooth	Indeterminate	19.1	12.7	1	STP	1
66-08-2116	4	Body	Smooth	Smooth	Indeterminate	7.6	6.8	1	STP	1
66-08-2116	5	Body	Smooth	Smooth	Indeterminate	12.4	6.8	1	STP	1
66-08-2116	6	Body	Smooth	Smooth	Indeterminate	11.2	6.6	1	STP	1
66-08-2116	7	Body	Smooth	Indeterminate	Calcareous	16.1	6.1	1	STP	1
66-08-2116	8	Body	Smooth	Smooth	Calcareous	14.3	4.9	1	STP	1
66-08-2117	1	Body	Smooth	Smooth	Indeterminate	21.1	9.4	0	General Surface	N/A
66-08-2117	2	Body	Smooth	Smooth	Indeterminate	25.9	11.1	0	General Surface	N/A
66-08-2117	3	Body	Smooth	Smooth	Indeterminate	36.2	11.1	0	General Surface	N/A
66-08-2117	4	Body	Indeterminate	Smooth	Indeterminate	16.1	15.1	0	General Surface	N/A
66-08-2117	7	Body	Smooth	Smooth	Indeterminate	30.6	11.5	0	General Surface	N/A
66-08-2117	8	B NOS	Indeterminate	Indeterminate	Indeterminate	33.4	16	1	General Surface	N/A
66-08-2117	11	Body	Smooth	Smooth	Indeterminate	15.3	7.1	0	General Surface	N/A
66-08-2117	12	Body	Smooth	Smooth	Indeterminate	16.9	9.5	0	General Surface	N/A
66-08-2117	13	Body	Smooth	Smooth	Indeterminate	11.9	13.9	0	General Surface	N/A
66-08-2117	14	Body	Smooth	Smooth	Indeterminate	16.9	11	0	General Surface	N/A
66-08-2117	15	Body	Smooth	Smooth	Indeterminate	19.3	8.5	0	General Surface	N/A
66-08-2117	16	B NOS	Smooth	Smooth	Indeterminate	17.9	14.3	1	General Surface	N/A

66-08-2117	17	Body	Smooth	Smooth	Indeterminate	34.4	9.1	0	General Surface	N/A
66-08-2117	18	Body	Smooth	Smooth	Indeterminate	47.5	19.5	0	General Surface	N/A
66-08-2117	19	Body	Smooth	Smooth	Indeterminate	34.6	6.4	0	General Surface	N/A
66-08-2117	20	Body	Smooth	Smooth	Indeterminate	23.5	10.2	0	General Surface	N/A
66-08-2117	21	B NOS	Smooth	Smooth	Calcareous	25	14.6	1	General Surface	N/A
66-08-2117	22	Body	Smooth	Smooth	Calcareous	16.1	12.7	0	General Surface	N/A
66-08-2117	23	Body	Smooth	Smooth	Indeterminate	19.9	8.4	0	General Surface	N/A
66-08-2117	24	Body	Smooth	Smooth	Indeterminate	30.8	8.6	0	General Surface	N/A
66-08-2117	25	Body	Smooth	Smooth	Indeterminate	15.1	8.7	0	General Surface	N/A
66-08-2117	26	Body	Smooth	Smooth	Indeterminate	14.4	8.1	0	General Surface	N/A
66-08-2117	27	Body	Smooth	Smooth	Indeterminate	20.9	9.7	0	General Surface	N/A
66-08-2117	28	Body	Smooth	Smooth	Indeterminate	13.1	8.3	0	General Surface	N/A
66-08-2117	29	B NOS	Scraped	Smooth	Mixed	64.4	14	1	General Surface	N/A
66-08-2117	30	Body	Smooth	Smooth	Calcareous	23.5	15.1	0	General Surface	N/A
66-08-2117	31	Body	Smooth	Smooth	Indeterminate	26.4	16.2	0	General Surface	N/A
66-08-2117	32	Body	Indeterminate	Smooth	Indeterminate	17.3	10.8	0	General Surface	N/A
66-08-2117	33	B NOS	Smooth	Smooth	Calcareous	40.4	15.6	1	General Surface	N/A
66-08-2117	35	B NOS	Smooth	Indeterminate	Calcareous	35.4	15.7	1	General Surface	N/A
66-08-2117	36	Body	Indeterminate	Smooth	Indeterminate	43.8	9.2	0	General Surface	N/A
66-08-2117	37	Body	Combed	Smooth	Indeterminate	47.4	10.5	1	General Surface	N/A
66-08-2117	39	Body	Smooth	Smooth	Indeterminate	17.7	12.1	0	General Surface	N/A
66-08-2117	41	Body	Smooth	Smooth	Indeterminate	20.7	7.1	0	General Surface	N/A
66-08-2117	42	Body	Smooth	Smooth	Indeterminate	31.8	9.3	0	General Surface	N/A
66-08-2117	43	B Incurvate	Smooth	Smooth	Calcareous	104	27.1	1	General Surface	N/A
66-08-2117	44	Body	Smooth	Smooth	Indeterminate	17.2	7.6	0	General Surface	N/A
66-08-2117	45	B Flared	Smooth	Smooth	Indeterminate	60.9	38.6	1	General Surface	N/A
66-08-2117	46	B NOS	Smooth	Smooth	Calcareous	46.5	15.1	1	General Surface	N/A
66-08-2117	47	Body	Smooth	Smooth	Indeterminate	16.1	13.9	0	General Surface	N/A
66-08-2117	48	B NOS	Combed	Smooth	Calcareous	57	18.4	1	General Surface	N/A
66-08-2117	49	Body	Combed	Smooth	Indeterminate	32.6	11.6	1	STP	2
66-08-2117	50	Body	Smooth	Smooth	Calcareous	12.7	7.2	1	STP	17
66-08-2117	51	Body	Smooth	Smooth	Calcareous	15.9	7.3	1	STP	17
66-08-2117	52	Body	Smooth	Smooth	Indeterminate	22.9	7	1	STP	10
66-08-2117	53	Body	Indeterminate	Smooth	Indeterminate	14.9	10.2	1	STP	10

66-08-2117	54	Body	Smooth	Smooth	Calcareous	20.3	9.7	1	STP	10
66-08-2117	55	Unknown	Indeterminate	Indeterminate	Indeterminate	20.5	14.5	1	STP	10
66-08-2117	56	Body	Smooth	Smooth	Calcareous	22.8	9.9	1	STP	11
66-08-2117	57	Body	Smooth	Smooth	Calcareous	25.8	11.9	1	STP	12
66-08-2117	58	Body	Smooth	Smooth	Calcareous	24.9	10.3	1	STP	12
66-08-2117	59	Body	Smooth	Indeterminate	Indeterminate	13.8	13	1	STP	12
66-08-2117	60	Body	Indeterminate	Indeterminate	Indeterminate	18.2	10.6	1	STP	12
66-08-2117	61	Body	Smooth	Smooth	Indeterminate	12.8	7.3	1	STP	12
66-08-2117	62	Body	Smooth	Smooth	Calcareous	11.4	8.5	1	STP	12
66-08-2117	63	Body	Smooth	Indeterminate	Indeterminate	15.3	8.4	1	STP	25
66-08-2117	64	Body	Smooth	Smooth	Indeterminate	13.3	8	1	STP	26
66-08-2117	65	Body	Combed	Smooth	Indeterminate	15.3	7	1	STP	26
66-08-2117	66	Body	Indeterminate	Smooth	Calcareous	19.5	10.8	1	STP	26
66-08-2117	67	Body	Smooth	Smooth	Indeterminate	23.3	17.6	1	STP	28
66-08-2117	68	Body	Indeterminate	Indeterminate	Calcareous	24.9	9.6	1	STP	28
66-08-2117	69	Body	Smooth	Smooth	Indeterminate	22.4	7.5	1	STP	28
66-08-2117	70	Body	Smooth	Smooth	Calcareous	14.1	6.1	1	STP	28
66-08-2117	71	Body	Smooth	Smooth	Indeterminate	13.9	7.5	1	STP	29
66-08-2117	73	Body	Smooth	Smooth	Calcareous	18.3	7.3	0	General Surface	N/A
66-08-2117	74	Body	Indeterminate	Indeterminate	Indeterminate	24.3	10.3	0	General Surface	N/A
66-08-2117	82	Body	Smooth	Smooth	Calcareous	30.3	6.1	1	General Surface	N/A
66-08-2117	83	Body	Smooth	Smooth	Calcareous	18.2	8.3	1	General Surface	N/A
66-08-2117	84	Body	Smooth	Smooth	Calcareous	22.4	13.3	1	General Surface	N/A
66-08-2117	85	Body	Smooth	Smooth	Calcareous	38.2	13.8	0	General Surface	N/A
66-08-2117	86	Body	Smooth	Indeterminate	Calcareous	27.8	12.3	0	General Surface	N/A
66-08-2117	87	Body	Smooth	Smooth	Calcareous	21.7	9.2	0	General Surface	N/A
66-08-2117	88	Body	Smooth	Indeterminate	Indeterminate	22.1	10.3	0	General Surface	N/A
66-08-2117	89	Body	Combed	Smooth	Indeterminate	27	7.7	1	General Surface	N/A
66-08-2117	90	Body	Smooth	Smooth	Calcareous	23.9	5.8	0	General Surface	N/A
66-08-2117	91	Body	Smooth	Smooth	Indeterminate	15.2	7.5	0	General Surface	N/A
66-08-2117	92	Body	Smooth	Smooth	Indeterminate	10.7	4.9	0	General Surface	N/A
66-08-2117	93	Body	Combed	Smooth	Indeterminate	32.7	8.7	1	General Surface	N/A
66-08-2117	94	Body	Combed	Smooth	Calcareous	29.3	10	1	General Surface	N/A
66-08-2117	95	Body	Smooth	Smooth	Calcareous	18.6	10.8	0	General Surface	N/A

66-08-2117	96	Body	Indeterminate	Smooth	Calcareous	19.8	9.4	0	General Surface	N/A
66-08-2117	97	Body	Smooth	Smooth	Mixed	24.2	11.2	0	General Surface	N/A
66-08-2117	103	Body	Smooth	Smooth	Indeterminate	29.8	11.2	0	General Surface	N/A
66-08-2117	109	Body	Smooth	Smooth	Calcareous	23.3	8.1	0	General Surface	N/A
66-08-2117	110	Body	Smooth	Smooth	Indeterminate	19.8	7.3	0	General Surface	N/A
66-08-2117	111	Body	Indeterminate	Smooth	Indeterminate	20.2	6.8	0	General Surface	N/A
66-08-2117	112	Body	Indeterminate	Smooth	Calcareous	18.9	7	0	General Surface	N/A
66-08-2117	117	Body	Smooth	Indeterminate	Calcareous	21.2	6.3	0	General Surface	N/A
66-08-2118	1	B NOS	Combed (Intermittent)	Smooth	Indeterminate	54.8	16.5	1	General Surface	N/A
66-08-2118	2	B NOS	Smooth	Smooth	Calcareous	42.7	16.9	1	General Surface	N/A
66-08-2118	3	Body	Smooth	Smooth	Indeterminate	35.6	9.9	0	General Surface	N/A
66-08-2118	4	B NOS	Smooth	Smooth	Indeterminate	56.5	20	1	General Surface	N/A
66-08-2118	5	B NOS	Indeterminate	Smooth	Calcareous	27.4	12.6	1	General Surface	N/A
66-08-2118	6	Body	Smooth	Smooth	Indeterminate	24.9	8.5	0	General Surface	N/A
66-08-2118	7	Body	Smooth	Smooth	Indeterminate	31.1	10.2	0	General Surface	N/A
66-08-2118	8	Body	Smooth	Smooth	Indeterminate	19.8	10.7	0	General Surface	N/A
66-08-2118	9	Body	Smooth	Smooth	Calcareous	36.6	10.1	0	General Surface	N/A
66-08-2118	10	Body	Smooth	Smooth	Indeterminate	22.2	10.3	0	General Surface	N/A
66-08-2118	11	Body	Smooth	Smooth	Indeterminate	21.2	8.2	0	General Surface	N/A
66-08-2118	12	Body	Smooth	Smooth	Indeterminate	20.2	9.9	0	General Surface	N/A
66-08-2118	13	Body	Smooth	Smooth	Calcareous	22.9	9.5	0	General Surface	N/A
66-08-2118	14	Body	Smooth	Smooth	Indeterminate	22.2	7.9	0	General Surface	N/A
66-08-2118	15	Body	Smooth	Smooth	Calcareous	22.9	9.3	0	General Surface	N/A
66-08-2118	16	Body	Smooth	Indeterminate	Calcareous	41.7	13.2	0	General Surface	N/A
66-08-2118	17	Body	Smooth	Smooth	Calcareous	26.5	7.4	0	General Surface	N/A
66-08-2118	18	B NOS	Smooth	Smooth	Indeterminate	24.8	19.6	1	General Surface	N/A
66-08-2118	19	Body	Smooth	Smooth	Calcareous	38.3	13.9	0	General Surface	N/A
66-08-2118	20	B NOS	Smooth	Indeterminate	Indeterminate	26.2	18.5	1	General Surface	N/A
66-08-2118	21	Body	Smooth	Smooth	Calcareous	32.3	11.7	0	General Surface	N/A
66-08-2118	22	Body	Smooth	Smooth	Indeterminate	18.8	7.2	0	General Surface	N/A
66-08-2118	23	Body	Smooth	Smooth	Indeterminate	18.1	9	0	General Surface	N/A
66-08-2118	24	Body	Smooth	Indeterminate	Indeterminate	16.7	10.1	0	General Surface	N/A
66-08-2118	25	Body	Smooth	Smooth	Indeterminate	13.4	8.1	0	General Surface	N/A
66-08-2118	26	Body	Smooth	Smooth	Calcareous	29.6	10.5	0	General Surface	N/A

66-08-2118	27	B NOS	Smooth	Indeterminate	Indeterminate	20.1	11.6	1	General Surface	N/A
66-08-2118	28	B NOS	Smooth	Smooth	Indeterminate	33.3	17.5	1	General Surface	N/A
66-08-2118	29	Body	Smooth	Smooth	Indeterminate	19.3	8.1	0	General Surface	N/A
66-08-2118	30	Body	Smooth	Smooth	Indeterminate	9999	9999	0	General Surface	N/A
66-08-2118	31	Body	Smooth	Smooth	Indeterminate	9999	9999	0	General Surface	N/A
66-08-2118	32	Body	Smooth	Smooth	Indeterminate	9999	9999	0	General Surface	N/A
66-08-2118	33	Body	Smooth	Smooth	Indeterminate	30.1	11.1	0	General Surface	N/A
66-08-2118	34	B NOS	Indeterminate	Smooth	Indeterminate	51.4	15.4	1	General Surface	N/A
66-08-2118	35	Body	Smooth	Smooth	Indeterminate	14.4	7.5	0	General Surface	N/A
66-08-2118	36	Body	Smooth	Smooth	Indeterminate	33.3	8.5	0	General Surface	N/A
66-08-2118	37	B NOS	Combed	Smooth	Mixed	25.2	14.6	1	General Surface	N/A
66-08-2118	38	B NOS	Smooth	Smooth	Calcareous	51.4	20.2	1	General Surface	N/A
66-08-2118	39	Body	Smooth	Smooth	Calcareous	51.8	13.7	0	General Surface	N/A
66-08-2118	40	Body	Smooth	Smooth	Indeterminate	34.8	17.9	0	General Surface	N/A
66-08-2118	41	B NOS	Smooth	Smooth	Indeterminate	31.8	14.9	1	General Surface	N/A
66-08-2118	42	Body	Smooth	Smooth	Indeterminate	45	14.3	0	General Surface	N/A
66-08-2118	43	Body	Smooth	Smooth	Calcareous	53	12.4	0	General Surface	N/A
66-08-2118	44	B NOS	Smooth	Smooth	Calcareous	26	14.9	1	General Surface	N/A
66-08-2118	45	Body	Smooth	Smooth	Calcareous	28.8	9.2	0	General Surface	N/A
66-08-2118	46	Body	Smooth	Smooth	Indeterminate	16.4	9.6	0	General Surface	N/A
66-08-2118	47	Body	Smooth	Smooth	Indeterminate	18.2	15.9	0	General Surface	N/A
66-08-2118	48	Body	Smooth	Smooth	Indeterminate	24	9.8	0	General Surface	N/A
66-08-2118	49	Body	Smooth	Smooth	Indeterminate	23.8	10.7	0	General Surface	N/A
66-08-2118	51	B NOS	Smooth	Indeterminate	Calcareous	35	19.6	1	General Surface	N/A
66-08-2118	52	Body	Scraped	Smooth	Calcareous	60	11	0	General Surface	N/A
66-08-2118	53	B NOS	Smooth	Smooth	Calcareous	37.1	20.4	1	General Surface	N/A
66-08-2118	54	Body	Smooth	Smooth	Calcareous	58.9	12.7	0	General Surface	N/A
66-08-2118	55	Body	Smooth	Smooth	Indeterminate	41.3	13.2	0	General Surface	N/A
66-08-2118	56	Body	Smooth	Indeterminate	Indeterminate	27.7	7.6	0	General Surface	N/A
66-08-2118	57	Body	Smooth	Smooth	Indeterminate	33.2	12.6	0	General Surface	N/A
66-08-2118	58	Base	Incised (R)	Smooth	Indeterminate	84.6	13	1	General Surface	N/A
66-08-2118	59	B NOS	Smooth	Smooth	Calcareous	50.4	16.7	1	General Surface	N/A
66-08-2118	60	Body	Smooth	Smooth	Indeterminate	19.9	10.6	0	General Surface	N/A
66-08-2118	61	Body	Smooth	Smooth	Indeterminate	27.1	19.3	0	General Surface	N/A

66-08-2118	62	Body	Smooth	Smooth	Indeterminate	31.9	11.1	0	General Surface	N/A
66-08-2118	63	Body	Indeterminate	Smooth	Indeterminate	22.8	12.7	0	General Surface	N/A
66-08-2118	64	Body	Smooth	Smooth	Indeterminate	17.2	11.2	0	General Surface	N/A
66-08-2118	65	Body	Smooth	Smooth	Indeterminate	33.1	11.4	0	General Surface	N/A
66-08-2118	66	Body	Smooth	Smooth	Indeterminate	22.4	13.9	0	General Surface	N/A
66-08-2118	67	Body	Smooth	Smooth	Indeterminate	17.4	10	0	General Surface	N/A
66-08-2118	68	Body	Smooth	Smooth	Indeterminate	17.1	8.4	0	General Surface	N/A
66-08-2118	69	Body	Smooth	Smooth	Indeterminate	22.7	9.5	0	General Surface	N/A
66-08-2118	70	Body	Smooth	Smooth	Indeterminate	27.3	18.9	0	General Surface	N/A
66-08-2118	71	Body	Smooth	Smooth	Indeterminate	19.4	10.1	0	General Surface	N/A
66-08-2118	72	B NOS	Smooth	Scraped	Indeterminate	66.8	17.1	1	General Surface	N/A
66-08-2118	73	Body	Smooth	Smooth	Indeterminate	17.4	11.7	0	General Surface	N/A
66-08-2118	74	Body	Smooth	Smooth	Indeterminate	17.6	8.9	0	General Surface	N/A
66-08-2118	75	Body	Smooth	Smooth	Indeterminate	28.2	14.9	0	General Surface	N/A
66-08-2118	76	Body	Smooth	Smooth	Indeterminate	22.4	12.6	0	General Surface	N/A
66-08-2118	77	B NOS	Smooth	Scraped	Indeterminate	24.2	18.1	1	General Surface	N/A
66-08-2118	78	Body	Smooth	Smooth	Calcareous	21.8	10.3	0	General Surface	N/A
66-08-2118	79	Body	Indeterminate	Smooth	Calcareous	25.8	11.7	0	General Surface	N/A
66-08-2118	80	Body	Smooth	Smooth	Calcareous	22.1	12.9	0	General Surface	N/A
66-08-2118	81	Body	Smooth	Smooth	Calcareous	26.9	11.4	0	General Surface	N/A
66-08-2118	82	Body	Smooth	Smooth	Calcareous	47.3	14.3	0	General Surface	N/A
66-08-2118	83	Body	Smooth	Smooth	Indeterminate	25.3	11.7	0	General Surface	N/A
66-08-2118	84	Body	Smooth	Smooth	Indeterminate	21.3	7.2	0	General Surface	N/A
66-08-2118	85	B NOS	Smooth	Smooth	Indeterminate	29.4	10.8	1	General Surface	N/A
66-08-2118	86	B NOS	Smooth	Other	Calcareous	25.3	16.2	1	General Surface	N/A
66-08-2118	87	Body	Smooth	Smooth	Indeterminate	19.8	11.3	0	General Surface	N/A
66-08-2118	88	Body	Indeterminate	Indeterminate	Indeterminate	41.1	19	0	General Surface	N/A
66-08-2118	89	Body	Smooth	Smooth	Calcareous	11.4	7.8	1	STP	5
66-08-2118	90	Body	Indeterminate	Indeterminate	Indeterminate	13.5	8.5	1	STP	7
66-08-2118	91	Body	Indeterminate	Smooth	Indeterminate	15.7	8.5	1	STP	7
66-08-2118	92	Body	Smooth	Smooth	Indeterminate	18.7	8.4	1	STP	8
66-08-2118	93	Body	Smooth	Smooth	Indeterminate	14.9	6.3	1	STP	8
66-08-2118	94	Body	Smooth	Smooth	Indeterminate	14.5	6.5	1	STP	8
66-08-2118	95	B NOS	Smooth	Smooth	Indeterminate	36.5	14.6	1	STP	9

66-08-2118	96	Body	Smooth	Smooth	Indeterminate	25.5	9.7	1	STP	9
66-08-2118	97	Body	Smooth	Smooth	Indeterminate	19.5	8.9	1	STP	9
66-08-2118	98	Body	Smooth	Indeterminate	Indeterminate	20.1	9.8	1	STP	9
66-08-2118	99	Body	Smooth	Smooth	Calcareous	19	10.6	1	STP	10
66-08-2118	100	Body	Combed (Intermittent)	Smooth	Indeterminate	29.5	9999	1	STP	11
66-08-2118	101	B NOS	Smooth	Smooth	Mixed	51.5	14.3	1	STP	14
66-08-2118	102	Body	Smooth	Smooth	Indeterminate	13.7	8.1	1	STP	14
66-08-2118	103	Body	Smooth	Smooth	Indeterminate	18	7.8	1	STP	14
66-08-2118	104	Body	Smooth	Smooth	Indeterminate	15.8	8.1	1	STP	15
66-08-2118	105	Body	Smooth	Smooth	Indeterminate	12.4	4	1	STP	15
66-08-2118	106	Body	Indeterminate	Indeterminate	Indeterminate	12.9	4.9	1	STP	15
66-08-2118	107	Body	Smooth	Smooth	Indeterminate	19.4	6.2	1	STP	15
66-08-2118	108	Body	Smooth	Smooth	Indeterminate	22.3	7.8	1	STP	15
66-08-2118	109	Body	Smooth	Smooth	Indeterminate	9.8	11.1	1	STP	15
66-08-2118	110	Body	Smooth	Smooth	Indeterminate	18	8.4	1	STP	16
66-08-2118	111	Body	Smooth	Smooth	Indeterminate	20.9	9.4	1	STP	16
66-08-2118	112	Body	Smooth	Smooth	Indeterminate	11	6.3	1	STP	17
66-08-2118	113	Body	Smooth	Smooth	Indeterminate	11.1	5.1	1	STP	17
66-08-2118	114	Body	Smooth	Smooth	Indeterminate	10.2	8.4	1	STP	17
66-08-2118	115	Body	Smooth	Smooth	Indeterminate	7.4	9	1	STP	17
66-08-2118	116	B NOS	Smooth	Smooth	Indeterminate	25.5	16.3	1	STP	19
66-08-2119	1	B NOS	Indeterminate	Indeterminate	Calcareous	48.3	19.7	1	General Surface	N/A
66-08-2119	3	Body	Smooth	Smooth	Calcareous	53.2	17.8	0	General Surface	N/A
66-08-2119	4	Body	Smooth	Smooth	Calcareous	38.7	14.3	0	General Surface	N/A
66-08-2119	5	Body	Smooth	Smooth	Calcareous	30.9	18.5	0	General Surface	N/A
66-08-2119	6	B NOS	Smooth	Smooth	Calcareous	22.7	12.9	1	General Surface	N/A
66-08-2119	7	Body	Smooth	Smooth	Calcareous	20.2	11.9	0	General Surface	N/A
66-08-2119	8	Body	Scraped	Smooth	Indeterminate	38	11.5	0	General Surface	N/A
66-08-2119	9	B NOS	Indeterminate	Smooth	Indeterminate	36.5	22.2	1	General Surface	N/A
66-08-2119	12	Body	Scraped	Smooth	Indeterminate	27.8	11.9	0	General Surface	N/A
66-08-2119	13	Body	Smooth	Smooth	Indeterminate	19.6	8.1	0	General Surface	N/A
66-08-2119	14	Body	Combed	Smooth	Calcareous	37.9	12.4	1	STP	2
66-08-2119	15	Body	Combed	Smooth	Calcareous	26.9	13	1	STP	2
66-08-2119	16	Body	Combed	Smooth	Calcareous	31.7	11.8	1	STP	2

66-08-2119	17	Body	Combed	Smooth	Calcareous	23	12.2	1	STP	2
66-08-2119	18	Body	Smooth	Smooth	Indeterminate	26.7	11.6	1	STP	2
66-08-2119	19	Body	Indeterminate	Smooth	Indeterminate	13.8	8.6	1	STP	2
66-08-2119	20	Body	Combed	Smooth	Indeterminate	22.7	8.3	1	STP	3
66-08-2119	21	Body	Smooth	Indeterminate	Calcareous	18.3	9.2	1	STP	3
66-08-2120	1	Body	Smooth	Smooth	Indeterminate	19.1	12.1	0	General Surface	N/A
66-08-2120	2	Body	Smooth	Smooth	Indeterminate	14.8	8.2	0	General Surface	N/A
66-08-2120	3	Body	Combed	Smooth	Calcareous	23.1	9.1	1	STP	1
66-08-2120	4	Body	Indeterminate	Smooth	Indeterminate	23.2	9.9	1	STP	1
66-08-2120	5	Body	Smooth	Smooth	Indeterminate	15.3	9.7	1	STP	1
66-08-2120	6	Body	Smooth	Smooth	Indeterminate	31.5	7.5	1	STP	1
66-08-2120	7	Body	Smooth	Smooth	Indeterminate	25.4	7.4	1	STP	1
66-08-2120	8	B NOS	Smooth	Smooth	Indeterminate	41.1	15.9	1	STP	1
66-08-2121	1	Body	Smooth	Smooth	Indeterminate	28.2	13.2	0	General Surface	N/A
66-08-2121	3	B NOS	Smooth	Smooth	Indeterminate	83.8	16	1	General Surface	N/A
66-08-2121	4	Body	Smooth	Smooth	Indeterminate	24.5	6.6	0	General Surface	N/A
66-08-2121	5	Body	Smooth	Smooth	Indeterminate	21.5	6.4	0	General Surface	N/A
66-08-2121	6	Body	Smooth	Smooth	Indeterminate	10.1	6	0	General Surface	N/A
66-08-2121	7	Body	Smooth	Smooth	Indeterminate	22.8	9.9	0	General Surface	N/A
66-08-2121	8	Body	Smooth	Smooth	Calcareous	34.7	15.9	0	General Surface	N/A
66-08-2121	9	Body	Smooth	Smooth	Calcareous	17.3	8.7	0	General Surface	N/A
66-08-2121	10	Body	Smooth	Smooth	Indeterminate	20.8	10.2	0	General Surface	N/A
66-08-2121	11	Body	Smooth	Smooth	Indeterminate	32.3	10.9	0	General Surface	N/A
66-08-2121	13	Body	Smooth	Smooth	Indeterminate	24	12.9	0	General Surface	N/A
66-08-2121	14	Body	Smooth	Smooth	Indeterminate	26.3	9.1	0	General Surface	N/A
66-08-2121	15	Body	Smooth	Smooth	Indeterminate	51.2	16.6	0	General Surface	N/A
66-08-2121	16	Body	Indeterminate	Smooth	Indeterminate	11.6	8.1	0	General Surface	N/A
66-08-2121	17	Body	Indeterminate	Smooth	Indeterminate	21.5	8.4	0	General Surface	N/A
66-08-2121	18	Body	Indeterminate	Smooth	Indeterminate	19.9	11.1	0	General Surface	N/A
66-08-2121	19	Body	Smooth	Smooth	Indeterminate	26.5	13.8	0	General Surface	N/A
66-08-2121	20	Body	Smooth	Smooth	Indeterminate	19.7	12.9	0	General Surface	N/A
66-08-2121	21	Body	Smooth	Smooth	Indeterminate	20.8	9.8	0	General Surface	N/A
66-08-2121	22	B NOS	Smooth	Smooth	Calcareous	19.9	12.8	1	General Surface	N/A
66-08-2121	23	B NOS	Smooth	Smooth	Calcareous	28.3	13.4	1	General Surface	N/A

66-08-2121	24	Body	Smooth	Smooth	Indeterminate	23.5	11.7	0	General Surface	N/A
66-08-2121	25	Body	Indeterminate	Smooth	Indeterminate	21.9	12.7	0	General Surface	N/A
66-08-2121	26	Body	Smooth	Smooth	Indeterminate	30.3	9.2	0	General Surface	N/A
66-08-2121	27	Body	Indeterminate	Smooth	Indeterminate	17.4	7.7	0	General Surface	N/A
66-08-2121	29	Body	Smooth	Smooth	Indeterminate	34.1	14.6	0	General Surface	N/A
66-08-2121	30	Body	Indeterminate	Smooth	Indeterminate	13.1	8.3	0	General Surface	N/A
66-08-2121	31	Body	Smooth	Smooth	Indeterminate	42.7	7.8	0	General Surface	N/A
66-08-2121	32	Body	Smooth	Smooth	Indeterminate	25.7	15.1	0	General Surface	N/A
66-08-2121	33	Body	Smooth	Smooth	Indeterminate	24.7	17.7	0	General Surface	N/A
66-08-2121	34	Body	Smooth	Smooth	Indeterminate	41.9	16.4	0	General Surface	N/A
66-08-2121	35	Body	Smooth	Smooth	Calcareous	37.9	17.5	0	General Surface	N/A
66-08-2121	36	B Incurvate	Smooth	Smooth	Mixed	52.7	25.8	1	General Surface	N/A
66-08-2121	37	Body	Smooth	Smooth	Indeterminate	25.5	17.1	0	General Surface	N/A
66-08-2121	38	B Incurvate	Indeterminate	Cord Marked	Calcareous	65.9	27.1	1	General Surface	N/A
66-08-2121	39	Body	Smooth	Smooth	Calcareous	19.1	8	1	STP	1
66-08-2121	40	Body	Scraped	Smooth	Indeterminate	29.6	7.7	1	STP	3
66-08-2121	41	Body	Scraped	Smooth	Calcareous	23.6	7	1	STP	5
66-08-2121	42	Body	Scraped	Smooth	Indeterminate	24.1	8.2	1	STP	5
66-08-2121	43	Body	Smooth	Smooth	Indeterminate	25.1	7.5	1	STP	5
66-08-2121	44	Body	Smooth	Smooth	Indeterminate	23.6	7.3	1	STP	5
66-08-2121	45	Body	Smooth	Smooth	Indeterminate	22.2	11.1	1	STP	5
66-08-2121	46	Body	Combed	Smooth	Indeterminate	20.4	7.9	1	STP	5
66-08-2121	47	Body	Combed	Smooth	Indeterminate	26.2	7.9	1	STP	5
66-08-2121	48	Body	Combed	Smooth	Indeterminate	25.3	10.3	1	STP	5
66-08-2121	49	Body	Combed	Smooth	Indeterminate	19	9.2	1	STP	5
66-08-2121	50	Body	Combed	Smooth	Indeterminate	20.4	10.6	1	STP	5
66-08-2121	51	Body	Combed	Smooth	Indeterminate	17.1	8.1	1	STP	5
66-08-2121	52	Body	Combed	Smooth	Indeterminate	18.7	6.3	1	STP	5
66-08-2121	53	Body	Smooth	Smooth	Indeterminate	16.2	10.8	1	STP	5
66-08-2121	54	Body	Smooth	Smooth	Indeterminate	14.4	5.3	1	STP	5
66-08-2121	55	Body	Smooth	Indeterminate	Indeterminate	12.9	5.3	1	STP	5
66-08-2121	56	Body	Smooth	Smooth	Indeterminate	10.4	7	1	STP	5
66-08-2121	57	Body	Smooth	Indeterminate	Indeterminate	12	5.4	1	STP	5
66-08-2121	58	Body	Indeterminate	Smooth	Indeterminate	11.3	4.4	1	STP	5

66-08-2121	59	Body	Combed	Smooth	Calcareous	27.9	7.2	1	STP	6
66-08-2121	60	Body	Combed	Smooth	Indeterminate	24.6	8.4	1	STP	6
66-08-2121	61	Body	Indeterminate	Smooth	Indeterminate	21.4	9.5	1	STP	6
66-08-2121	62	Body	Smooth	Smooth	Indeterminate	13.5	7.4	1	STP	10
66-08-2121	63	Body	Combed	Indeterminate	Indeterminate	17.7	11.7	1	STP	10
66-08-2121	64	Body	Combed	Smooth	Indeterminate	15.4	8.9	1	STP	10
66-08-2121	65	Body	Combed	Smooth	Mixed	20.2	7.5	1	STP	10
66-08-2121	66	Body	Combed	Indeterminate	Indeterminate	16.9	7.9	1	STP	10
66-08-2121	67	Body	Indeterminate	Smooth	Indeterminate	24.2	16.3	1	STP	10
66-08-2121	68	Body	Smooth	Indeterminate	Indeterminate	21.4	11.6	1	STP	10
66-08-2121	69	Body	Smooth	Smooth	Calcareous	19.4	7.5	1	STP	10
66-08-2121	70	B NOS	Smooth	Smooth	Calcareous	37.2	13.1	1	STP	11
66-08-2121	71	Body	Smooth	Indeterminate	Indeterminate	21	12.2	1	STP	11
66-08-2121	72	Body	Smooth	Smooth	Indeterminate	20.3	9.4	1	STP	11
66-08-2121	73	Body	Smooth	Smooth	Indeterminate	16.8	8.7	1	STP	11
66-08-2121	74	Body	Smooth	Smooth	Indeterminate	10.8	6.2	1	STP	11
66-08-2122	1	Body	Smooth	Smooth	Indeterminate	29.5	11.5	0	General Surface	N/A
66-08-2122	2	Body	Scraped	Smooth	Indeterminate	22.3	10.2	0	General Surface	N/A
66-08-2122	3	Body	Smooth	Smooth	Indeterminate	24.2	12	0	General Surface	N/A
66-08-2122	4	Body	Smooth	Smooth	Indeterminate	19.8	10.5	0	General Surface	N/A
66-08-2122	5	Body	Indeterminate	Smooth	Indeterminate	10.6	10.9	0	General Surface	N/A
66-08-2122	6	Body	Indeterminate	Smooth	Indeterminate	39.2	11.6	0	General Surface	N/A
66-08-2122	7	Body	Smooth	Smooth	Indeterminate	11.7	11.5	0	General Surface	N/A
66-08-2122	8	Body	Smooth	Smooth	Indeterminate	11	9.3	0	General Surface	N/A
66-08-2122	9	Body	Smooth	Smooth	Indeterminate	11.4	6.9	0	General Surface	N/A
66-08-2122	10	Body	Smooth	Smooth	Indeterminate	15.9	13.2	0	General Surface	N/A
66-08-2122	11	Body	Indeterminate	Smooth	Indeterminate	21.1	9.2	0	General Surface	N/A
66-08-2122	12	Body	Smooth	Smooth	Indeterminate	24.9	12.6	0	General Surface	N/A
66-08-2122	13	Body	Smooth	Smooth	Indeterminate	17.7	11.5	0	General Surface	N/A
66-08-2122	14	Body	Smooth	Smooth	Indeterminate	28.9	17.4	0	General Surface	N/A
66-08-2122	15	B NOS	Smooth	Smooth	Calcareous	39.2	19.8	1	General Surface	N/A
66-08-2122	16	Body	Smooth	Smooth	Indeterminate	13.9	9.3	0	General Surface	N/A
66-08-2122	17	B NOS	Smooth	Smooth	Calcareous	26.9	14.1	1	General Surface	N/A
66-08-2122	18	Body	Smooth	Smooth	Indeterminate	31.8	10.3	0	General Surface	N/A

66-08-2122	19	Body	Smooth	Smooth	Indeterminate	18.9	9.3	0	General Surface	N/A
66-08-2122	20	Body	Smooth	Smooth	Indeterminate	18.4	9.2	0	General Surface	N/A
66-08-2122	21	Body	Smooth	Smooth	Indeterminate	14.6	6.4	0	General Surface	N/A
66-08-2122	23	Body	Smooth	Smooth	Indeterminate	17	9.8	0	General Surface	N/A
66-08-2122	24	Body	Smooth	Smooth	Indeterminate	15.1	7.5	0	General Surface	N/A
66-08-2122	25	Body	Smooth	Smooth	Indeterminate	23.1	9.6	0	General Surface	N/A
66-08-2122	26	Body	Indeterminate	Smooth	Indeterminate	28.2	8.6	0	General Surface	N/A
66-08-2122	27	Body	Indeterminate	Smooth	Indeterminate	16	11	0	General Surface	N/A
66-08-2122	28	Body	Smooth	Indeterminate	Indeterminate	12.9	9.4	0	General Surface	N/A
66-08-2122	29	B NOS	Smooth	Smooth	Indeterminate	13.3	16.5	1	General Surface	N/A
66-08-2122	30	Body	Smooth	Smooth	Indeterminate	21.1	12.4	0	General Surface	N/A
66-08-2122	31	B NOS	Smooth	Smooth	Calcareous	25.2	14.3	1	General Surface	N/A
66-08-2122	32	Body	Smooth	Smooth	Indeterminate	17.3	7.4	0	General Surface	N/A
66-08-2122	33	Body	Smooth	Smooth	Indeterminate	19.5	11.6	0	General Surface	N/A
66-08-2122	34	Body	Smooth	Smooth	Indeterminate	11.8	15.6	0	General Surface	N/A
66-08-2122	35	Body	Smooth	Smooth	Indeterminate	17.9	15.8	0	General Surface	N/A
66-08-2122	36	B NOS	Smooth	Smooth	Calcareous	62.9	18.2	1	General Surface	N/A
66-08-2122	37	Body	Smooth	Smooth	Indeterminate	9999	9999	0	General Surface	N/A
66-08-2122	38	Body	Indeterminate	Smooth	Indeterminate	29.6	7.5	0	General Surface	N/A
66-08-2122	39	Body	Smooth	Smooth	Indeterminate	25.6	7.2	0	General Surface	N/A
66-08-2122	40	Body	Indeterminate	Smooth	Indeterminate	22.9	8.9	0	General Surface	N/A
66-08-2122	41	Body	Smooth	Smooth	Indeterminate	19.5	12.5	0	General Surface	N/A
66-08-2122	42	Body	Smooth	Smooth	Indeterminate	23.5	9.6	0	General Surface	N/A
66-08-2122	43	B NOS	Smooth	Smooth	Calcareous	22.9	16.1	1	General Surface	N/A
66-08-2122	44	Body	Smooth	Smooth	Indeterminate	26.6	12	0	General Surface	N/A
66-08-2122	45	Body	Indeterminate	Smooth	Indeterminate	24.9	12.7	0	General Surface	N/A
66-08-2122	46	Body	Indeterminate	Smooth	Indeterminate	27	12.6	0	General Surface	N/A
66-08-2122	47	B NOS	Scraped	Smooth	Mixed	31.4	16.6	1	General Surface	N/A
66-08-2122	48	B NOS	Smooth	Smooth	Calcareous	29.4	16	1	General Surface	N/A
66-08-2122	49	Body	Smooth	Smooth	Indeterminate	44.3	17.6	0	General Surface	N/A
66-08-2122	50	Body	Combed	Indeterminate	Calcareous	31.1	13.5	1	General Surface	N/A
66-08-2122	51	Body	Smooth	Smooth	Indeterminate	27.2	11.2	0	General Surface	N/A
66-08-2122	53	B NOS	Smooth	Smooth	Calcareous	31.9	13.8	1	General Surface	N/A
66-08-2122	54	B NOS	Smooth	Smooth	Calcareous	47.7	16.8	1	General Surface	N/A

66-08-2122	55	B NOS	Smooth	Smooth	Calcareous	29.1	16.2	1	General Surface	N/A
66-08-2122	56	B NOS	Smooth	Smooth	Calcareous	52.9	16.2	1	General Surface	N/A
66-08-2122	57	Body	Indeterminate	Smooth	Indeterminate	20.6	12.3	0	General Surface	N/A
66-08-2122	58	Body	Smooth	Smooth	Indeterminate	20.8	10.5	0	General Surface	N/A
66-08-2122	59	Body	Smooth	Smooth	Indeterminate	33.4	11.2	0	General Surface	N/A
66-08-2122	60	Body	Smooth	Smooth	Calcareous	15.6	9.8	1	STP	3
66-08-2122	61	Body	Smooth	Smooth	Indeterminate	23.6	10.9	1	STP	3
66-08-2122	62	Body	Smooth	Smooth	Calcareous	17.7	11.5	1	STP	3
66-08-2122	63	Body	Combed	Indeterminate	Calcareous	25	7.8	1	STP	3
66-08-2122	64	Body	Smooth	Smooth	Calcareous	20.9	6.6	1	STP	3
66-08-2122	65	Body	Smooth	Smooth	Calcareous	22.5	6	1	STP	3
66-08-2122	66	Body	Combed	Smooth	Indeterminate	15.3	7.6	1	STP	3
66-08-2122	67	Body	Smooth	Smooth	Calcareous	11.4	6.5	1	STP	3
66-08-2122	68	Body	Smooth	Smooth	Calcareous	13.3	7.7	1	STP	3
66-08-2122	69	Body	Smooth	Smooth	Calcareous	11.2	8.5	1	STP	3
66-08-2122	70	Body	Indeterminate	Smooth	Indeterminate	14.1	7	1	STP	3
66-08-2122	71	B NOS	Combed/Scraped	Smooth	Calcareous	24.7	16.6	1	STP	3
66-08-2122	72	Body	Combed	Smooth	Calcareous	26.4	7.5	1	STP	6
66-08-2122	73	Body	Smooth	Smooth	Calcareous	31	11.9	1	STP	6
66-08-2122	74	Body	Combed	Smooth	Indeterminate	36.8	8.2	1	STP	7
66-08-2122	75	Body	Combed	Smooth	Indeterminate	34.2	9.5	1	STP	7
66-08-2122	76	Body	Combed	Smooth	Calcareous	28.4	8.2	1	STP	7
66-08-2122	77	Body	Combed	Smooth	Calcareous	37	9.5	1	STP	7
66-08-2122	78	Body	Combed	Smooth	Calcareous	31.4	8.4	1	STP	7
66-08-2122	79	Body	Combed	Smooth	Calcareous	26.6	9.6	1	STP	7
66-08-2122	80	Body	Combed	Indeterminate	Calcareous	33.7	8.8	1	STP	7
66-08-2122	81	Body	Scraped	Smooth	Indeterminate	25.4	8.9	1	STP	7
66-08-2122	82	Body	Smooth	Smooth	Indeterminate	22.6	6.3	1	STP	7
66-08-2122	83	Body	Smooth	Smooth	Indeterminate	19.6	11.4	1	STP	7
66-08-2122	84	Body	Smooth	Smooth	Calcareous	20.7	7.8	1	STP	7
66-08-2122	85	Body	Smooth	Smooth	Calcareous	13.7	5.4	1	STP	7
66-08-2122	86	Body	Smooth	Smooth	Indeterminate	17.5	10.3	1	STP	7
66-08-2122	87	Body	Smooth	Smooth	Indeterminate	22.9	11.3	1	STP	7
66-08-2122	88	Body	Smooth	Smooth	Mixed	22.3	12.4	1	STP	7

66-08-2122	89	Body	Smooth	Smooth	Calcareous	13.2	5.9	1	STP	7
66-08-2122	90	Body	Smooth	Smooth	Indeterminate	18.3	10	1	STP	7
66-08-2122	91	Body	Smooth	Smooth	Calcareous	12.4	5.7	1	STP	7
66-08-2122	92	Body	Smooth	Indeterminate	Indeterminate	13.1	5.2	1	STP	7
66-08-2122	93	Body	Smooth	Smooth	Indeterminate	16.7	10.1	1	STP	7
66-08-2122	94	Body	Smooth	Smooth	Indeterminate	12.4	9.8	1	STP	7
66-08-2122	95	Body	Smooth	Smooth	Calcareous	13.3	6.6	1	STP	7
66-08-2122	96	Body	Combed	Smooth	Indeterminate	12.6	6.6	1	STP	7
66-08-2122	97	Body	Smooth	Indeterminate	Indeterminate	18	11.7	1	STP	7
66-08-2122	98	Body	Smooth	Smooth	Indeterminate	12.4	12.8	1	STP	7
66-08-2122	99	Body	Smooth	Indeterminate	Indeterminate	17	12.7	1	STP	7
66-08-2122	100	Body	Smooth	Smooth	Indeterminate	10.2	8	1	STP	7
66-08-2122	101	Body	Smooth	Smooth	Calcareous	10.2	5.7	1	STP	7
66-08-2122	102	Body	Smooth	Smooth	Indeterminate	15.3	8.6	1	STP	7
66-08-2122	103	Body	Smooth	Smooth	Indeterminate	11.7	10.5	1	STP	7
66-08-2122	104	Body	Smooth	Indeterminate	Indeterminate	11.4	9.1	1	STP	7
66-08-2122	105	Body	Smooth	Indeterminate	Indeterminate	5	8.8	1	STP	7
66-08-2122	106	Body	Smooth	Indeterminate	Indeterminate	10.4	7.6	1	STP	7
66-08-2122	107	Body	Indeterminate	Indeterminate	Indeterminate	8.7	9.4	1	STP	7
66-08-2122	108	Body	Smooth	Indeterminate	Indeterminate	8.6	5.8	1	STP	7
66-08-2122	109	B NOS	Scraped	Smooth	Calcareous	32.2	21.8	1	STP	7
66-08-2122	110	Body	Smooth	Smooth	Calcareous	13.8	8.3	1	STP	7
66-08-2122	111	Body	Combed	Smooth	Indeterminate	26.5	14	1	STP	7
66-08-2122	112	Body	Combed	Smooth	Indeterminate	23.1	11.3	1	STP	7
66-08-2122	113	Body	Indeterminate	Smooth	Indeterminate	26.8	9.6	1	STP	7
66-08-2122	114	Body	Combed	Smooth	Indeterminate	19.5	9.4	1	STP	7
66-08-2122	115	Body	Combed	Smooth	Volcanic	16.5	9	1	STP	7
66-08-2122	116	Body	Indeterminate	Smooth	Indeterminate	18.6	11	1	STP	7
66-08-2122	117	Body	Smooth	Smooth	Indeterminate	19.1	8.5	1	STP	7
66-08-2122	118	Body	Smooth	Smooth	Indeterminate	13	6.7	1	STP	7
66-08-2122	119	Body	Smooth	Indeterminate	Indeterminate	12.1	5.5	1	STP	7
66-08-2122	120	Body	Indeterminate	Smooth	Indeterminate	13.2	7.7	1	STP	7
66-08-2122	121	Body	Smooth	Smooth	Indeterminate	12.8	9.1	1	STP	7
66-08-2122	122	Body	Smooth	Smooth	Indeterminate	12.8	9.1	1	STP	7

66-08-2122	123	Body	Punc/Scrp/Slp	Smooth	Indeterminate	46.1	11	1	STP	7
66-08-2122	124	Body	Punc/Scrp/Slp	Smooth	Indeterminate	21.1	9.5	1	STP	7
66-08-2122	125	Body	Punc/Scrp/Slp	Smooth	Indeterminate	34.2	8.8	1	STP	7
66-08-2122	126	Body	Scraped/Slipped	Smooth	Indeterminate	26.2	8.2	1	STP	7
66-08-2122	127	Body	Indeterminate	Indeterminate	Indeterminate	6.5	9.2	1	STP	8
66-08-2122	128	Body	Smooth	Smooth	Calcareous	14.5	6.6	1	STP	8
66-08-2122	129	Body	Indeterminate	Smooth	Calcareous	12.8	10.6	1	STP	8
66-08-2122	130	Body	Indeterminate	Indeterminate	Indeterminate	6.9	5.3	1	STP	8
66-08-2122	131	B NOS	Indeterminate	Indeterminate	Calcareous	17	18.4	1	STP	8
66-08-2122	132	Body	Smooth	Smooth	Calcareous	38.8	9.4	1	STP	9
66-08-2122	133	Body	Smooth	Indeterminate	Indeterminate	7.7	4.9	1	STP	9
66-08-2122	134	B NOS	Smooth	Smooth	Calcareous	32.8	13.3	1	STP	9
66-08-2122	135	Body	Indeterminate	Smooth	Calcareous	20.7	7.6	1	STP	11
66-08-2122	136	Body	Smooth	Smooth	Calcareous	20.2	13.4	1	STP	11
66-08-2122	137	Body	Smooth	Smooth	Calcareous	44.1	12.9	1	STP	11
66-08-2122	138	Body	Smooth	Smooth	Calcareous	16.1	10.9	1	STP	11
66-08-2122	139	Body	Smooth	Smooth	Calcareous	17.9	9.2	1	STP	11
66-08-2122	140	Body	Scraped	Smooth	Indeterminate	23.8	8.2	1	STP	12
66-08-2122	141	Body	Smooth	Indeterminate	Indeterminate	11.2	6.3	1	STP	12
66-08-2122	142	Body	Smooth	Smooth	Indeterminate	18.9	9	1	STP	12
66-08-2122	143	Body	Smooth	Smooth	Indeterminate	21.1	8.9	1	STP	12
66-08-2122	144	Body	Smooth	Smooth	Indeterminate	24.3	10.9	1	STP	12
66-08-2122	145	Body	Smooth	Smooth	Indeterminate	18.3	9.4	1	STP	12
66-08-2122	146	Body	Smooth	Smooth	Indeterminate	21.7	8.2	1	STP	12
66-08-2122	147	Body	Smooth	Smooth	Calcareous	13.9	10.1	1	STP	12
66-08-2122	148	Body	Smooth	Smooth	Indeterminate	13.2	5.6	1	STP	12
66-08-2122	149	Body	Smooth	Smooth	Indeterminate	11.5	8.6	1	STP	12
66-08-2122	150	Body	Smooth	Indeterminate	Indeterminate	13.4	9.6	1	STP	12
66-08-2122	151	Body	Smooth	Indeterminate	Indeterminate	7.9	4.2	1	STP	12
66-08-2122	152	Body	Smooth	Indeterminate	Calcareous	15.8	8.2	1	STP	13
66-08-2122	153	Body	Scraped	Smooth	Calcareous	19.5	8	1	STP	13
66-08-2122	154	Body	Smooth	Smooth	Indeterminate	22.5	10.7	1	STP	13
66-08-2122	155	Body	Combed	Smooth	Calcareous	23.1	8.6	1	STP	13
66-08-2122	156	Body	Smooth	Smooth	Calcareous	25.6	9.5	1	STP	13

66-08-2122	157	Body	Smooth	Smooth	Calcareous	22.1	5.2	1	STP	13
66-08-2122	158	Body	Smooth	Smooth	Indeterminate	17.2	8	1	STP	13
66-08-2122	159	Body	Smooth	Smooth	Calcareous	14.8	8.8	1	STP	13
66-08-2122	160	Body	Smooth	Smooth	Calcareous	28.1	10.5	1	STP	13
66-08-2122	161	Body	Smooth	Smooth	Indeterminate	18	9.8	1	STP	14
66-08-2122	162	Body	Smooth	Smooth	Calcareous	16.9	7.9	1	STP	14
66-08-2122	163	Body	Smooth	Smooth	Calcareous	14.3	7.2	1	STP	14
66-08-2122	164	Body	Combed	Smooth	Calcareous	16.7	9.3	1	STP	14
66-08-2122	165	Body	Smooth	Indeterminate	Indeterminate	11.3	9.8	1	STP	14
66-08-2122	166	Body	Smooth	Indeterminate	Indeterminate	11.7	5.6	1	STP	14
66-08-2122	167	Body	Smooth	Indeterminate	Indeterminate	13.5	6.3	1	STP	14
66-08-2123	1	B NOS	Combed	Smooth	Calcareous	31.4	13.8	1	General Surface	N/A
66-08-2123	2	Body	Smooth	Smooth	Indeterminate	25.1	12.9	0	General Surface	N/A
66-08-2123	3	Body	Smooth	Smooth	Indeterminate	27.3	10.4	0	General Surface	N/A
66-08-2123	4	Body	Smooth	Smooth	Indeterminate	13.5	9.2	0	General Surface	N/A
66-08-2123	5	B NOS	Smooth	Smooth	Indeterminate	39.4	15	0	General Surface	N/A
66-08-2123	6	Body	Smooth	Smooth	Indeterminate	35	10.3	0	General Surface	N/A
66-08-2123	7	B NOS	Smooth	Smooth	Indeterminate	41.9	15.7	0	General Surface	N/A
66-08-2123	8	B NOS	Indeterminate	Indeterminate	Indeterminate	20.9	17	0	General Surface	N/A
66-08-2123	10	Body	Indeterminate	Indeterminate	Calcareous	12.4	8.5	1	STP	2
66-08-2123	11	Body	Indeterminate	Indeterminate	Calcareous	9.8	7.9	1	STP	2
66-08-2123	12	Body	Indeterminate	Indeterminate	Calcareous	27.4	12	1	STP	3
66-08-2123	13	Body	Smooth	Smooth	Calcareous	43.7	9.7	1	STP	3
66-08-2123	14	Body	Smooth	Smooth	Calcareous	17.8	8.6	1	STP	4
66-08-2123	15	Body	Smooth	Smooth	Calcareous	21.6	11.1	1	STP	6
66-08-2123	16	Body	Indeterminate	Smooth	Calcareous	15.5	12	1	STP	6
66-08-2123	17	Body	Indeterminate	Smooth	Calcareous	16.3	9.3	1	STP	6
66-08-2123	18	Body	Indeterminate	Smooth	Calcareous	15.6	7.8	1	STP	6
66-08-2125	1	B NOS	Smooth	Smooth	Calcareous	47.6	15.6	1	General Surface	N/A
66-08-2125	2	Body	Smooth	Smooth	Indeterminate	12.1	7.6	0	General Surface	N/A
66-08-2125	3	Body	Smooth	Smooth	Indeterminate	18.6	12.1	0	General Surface	N/A
66-08-2125	4	Body	Smooth	Smooth	Calcareous	33.2	8.2	1	STP	1
66-08-2125	5	Body	Smooth	Smooth	Calcareous	30	8.6	1	STP	1
66-08-2125	6	Body	Smooth	Smooth	Calcareous	33.1	8.5	1	STP	1

66-08-2125	7	Body	Smooth	Smooth	Calcareous	17.8	7.9	1	STP	1
66-08-2125	8	Body	Smooth	Smooth	Calcareous	16.6	6.8	1	STP	1
66-08-2126	1	Body	Smooth	Smooth	Indeterminate	30.2	10.1	0	General Surface	N/A
66-08-2126	2	Body	Smooth	Smooth	Indeterminate	13.7	6.5	0	General Surface	N/A
66-08-2126	3	Body	Smooth	Smooth	Indeterminate	15.8	7.8	0	General Surface	N/A
66-08-2126	4	Body	Smooth	Smooth	Indeterminate	18.2	8.1	0	General Surface	N/A
66-08-2126	5	Body	Smooth	Indeterminate	Indeterminate	21.3	15.4	0	General Surface	N/A
66-08-2126	6	Body	Smooth	Smooth	Indeterminate	37.8	8.3	0	General Surface	N/A
66-08-2126	7	B NOS	Smooth	Smooth	Calcareous	34.1	16.2	1	General Surface	N/A
66-08-2126	8	B NOS	Indeterminate	Smooth	Calcareous	33.9	11	1	General Surface	N/A
66-08-2126	9	Body	Smooth	Smooth	Indeterminate	13.9	7.3	0	General Surface	N/A
66-08-2126	10	Body	Smooth	Smooth	Indeterminate	20.6	9.3	0	General Surface	N/A
66-08-2126	11	Body	Smooth	Smooth	Indeterminate	14.6	10.5	0	General Surface	N/A
66-08-2126	13	Body	Smooth	Smooth	Indeterminate	16.1	6.5	0	General Surface	N/A
66-08-2126	14	Body	Smooth	Smooth	Indeterminate	28.4	10.6	0	General Surface	N/A
66-08-2126	15	Body	Smooth	Smooth	Indeterminate	25.7	7.4	0	General Surface	N/A
66-08-2126	16	Body	Indeterminate	Smooth	Indeterminate	23.7	13.2	0	General Surface	N/A
66-08-2126	17	Body	Smooth	Smooth	Indeterminate	16.6	14.7	0	General Surface	N/A
66-08-2126	18	B NOS	Smooth	Smooth	Calcareous	47	17.2	1	General Surface	N/A
66-08-2126	19	Body	Smooth	Smooth	Indeterminate	28	11.5	0	General Surface	N/A
66-08-2126	20	Body	Smooth	Smooth	Indeterminate	42.6	14.6	0	General Surface	N/A
66-08-2126	21	B NOS	Smooth	Smooth	Calcareous	48.3	16.2	1	General Surface	N/A
66-08-2126	22	Body	Pitted	Smooth	Indeterminate	25.3	13.6	0	General Surface	N/A
66-08-2126	23	Body	Smooth	Smooth	Indeterminate	30.1	8.7	0	General Surface	N/A
66-08-2126	24	Body	Indeterminate	Smooth	Indeterminate	37.8	23.5	0	General Surface	N/A
66-08-2126	25	Body	Smooth	Smooth	Indeterminate	24.6	8.5	0	General Surface	N/A
66-08-2126	26	Body	Smooth	Smooth	Indeterminate	10.7	7.6	0	General Surface	N/A
66-08-2126	27	Body	Smooth	Smooth	Indeterminate	28.6	8	0	General Surface	N/A
66-08-2126	28	B NOS	Smooth	Smooth	Calcareous	34.6	15.9	1	General Surface	N/A
66-08-2126	29	Body	Smooth	Smooth	Indeterminate	22.7	6.9	0	General Surface	N/A
66-08-2126	30	Body	Smooth	Smooth	Indeterminate	14.6	7.6	0	General Surface	N/A
66-08-2126	31	B NOS	Indeterminate	Smooth	Calcareous	31.6	13.2	1	General Surface	N/A
66-08-2126	32	Body	Smooth	Smooth	Indeterminate	15.5	7.6	0	General Surface	N/A
66-08-2126	33	Body	Smooth	Smooth	Indeterminate	21.9	8.1	0	General Surface	N/A

66-08-2126	34	B NOS	Smooth	Smooth	Volcanic	62.9	18.1	1	General Surface	N/A
66-08-2126	35	Body	Indeterminate	Smooth	Indeterminate	18.2	11.3	0	General Surface	N/A
66-08-2126	36	B NOS	Smooth	Smooth	Calcareous	26	13.2	1	General Surface	N/A
66-08-2126	37	Body	Incised (R)	Indeterminate	Indeterminate	13.6	9.4	0	General Surface	N/A
66-08-2126	38	Body	Indeterminate	Smooth	Indeterminate	23.6	8	0	General Surface	N/A
66-08-2126	39	Body	Indeterminate	Smooth	Indeterminate	19	13.2	0	General Surface	N/A
66-08-2126	40	B NOS	Smooth	Smooth	Calcareous	30	16.9	1	General Surface	N/A
66-08-2126	41	Body	Smooth	Smooth	Indeterminate	14.8	7.8	0	General Surface	N/A
66-08-2126	42	Body	Smooth	Smooth	Indeterminate	44.8	10.2	0	General Surface	N/A
66-08-2126	43	Body	Smooth	Smooth	Indeterminate	17.8	8.7	0	General Surface	N/A
66-08-2126	44	Body	Smooth	Smooth	Indeterminate	32	12.7	0	General Surface	N/A
66-08-2126	45	Body	Smooth	Smooth	Indeterminate	22.9	13.6	0	General Surface	N/A
66-08-2126	46	B NOS	Smooth	Smooth	Calcareous	21.3	15.2	1	General Surface	N/A
66-08-2126	47	B NOS	Smooth	Smooth	Calcareous	23	10.2	1	General Surface	N/A
66-08-2126	48	Body	Indeterminate	Smooth	Indeterminate	17.7	9.7	0	General Surface	N/A
66-08-2126	49	Body	Smooth	Smooth	Indeterminate	18.4	9.4	0	General Surface	N/A
66-08-2126	50	Body	Smooth	Smooth	Indeterminate	28.5	11.2	0	General Surface	N/A
66-08-2126	51	Body	Smooth	Smooth	Indeterminate	17.2	9.1	0	General Surface	N/A
66-08-2126	52	Body	Smooth	Smooth	Calcareous	17.6	7.1	1	STP	2
66-08-2126	53	Body	Smooth	Smooth	Calcareous	23.6	8	1	STP	2
66-08-2126	54	Body	Indeterminate	Smooth	Calcareous	16.4	12.5	1	STP	2
66-08-2126	55	Body	Smooth	Smooth	Calcareous	17.5	7.3	1	STP	2
66-08-2126	56	Body	Smooth	Smooth	Calcareous	18.7	7.3	1	STP	2
66-08-2126	57	Body	Indeterminate	Indeterminate	Calcareous	11.1	12.6	1	STP	2
66-08-2126	58	Body	Indeterminate	Smooth	Calcareous	9.5	10.2	1	STP	2
66-08-2126	59	Body	Indeterminate	Indeterminate	Calcareous	13.6	10	1	STP	2
66-08-2126	60	Body	Smooth	Indeterminate	Calcareous	11.5	8.6	1	STP	2
66-08-2126	61	Body	Indeterminate	Indeterminate	Calcareous	9.3	8.2	1	STP	2
66-08-2126	62	B NOS	Indeterminate	Smooth	Calcareous	28.8	11.7	1	STP	2
66-08-2126	63	Body	Indeterminate	Smooth	Calcareous	19.3	13.5	1	STP	3
66-08-2126	64	Body	Smooth	Smooth	Calcareous	14.8	9.3	1	STP	3
66-08-2126	65	Body	Smooth	Smooth	Indeterminate	24.8	7.6	1	STP	3
66-08-2126	66	Body	Smooth	Smooth	Indeterminate	10.4	8.2	1	STP	3
66-08-2126	67	Body	Indeterminate	Smooth	Indeterminate	18.1	10	1	STP	3

66-08-2126	68	Body	Smooth	Indeterminate	Calcareous	18.9	9.2	1	STP	3
66-08-2126	69	Body	Smooth	Indeterminate	Calcareous	11.8	9.7	1	STP	3
66-08-2126	70	Body	Smooth	Smooth	Calcareous	14	4.7	1	STP	3
66-08-2126	71	Body	Smooth	Smooth	Calcareous	15.6	11.5	1	STP	4
66-08-2126	72	Body	Smooth	Smooth	Calcareous	24.7	5.8	1	STP	4
66-08-2126	73	Body	Indeterminate	Smooth	Calcareous	15.8	14.9	1	STP	5
66-08-2126	74	Body	Indeterminate	Smooth	Indeterminate	22.1	13.3	1	STP	5
66-08-2126	75	Body	Smooth	Indeterminate	Calcareous	30.7	10.4	1	STP	9
66-08-2126	76	Body	Smooth	Smooth	Calcareous	24.3	16.3	1	STP	11
66-08-2126	77	Body	Smooth	Smooth	Calcareous	26.6	10.5	1	STP	11
66-08-2126	78	Body	Smooth	Smooth	Calcareous	24.8	11.4	1	STP	11
66-08-2126	79	Body	Smooth	Smooth	Calcareous	16.9	14.8	1	STP	11
66-08-2126	80	Body	Indeterminate	Smooth	Calcareous	14.2	10.6	0	STP	11
66-08-2126	81	Body	Scraped	Smooth	Calcareous	17.9	9.1	1	STP	11
66-08-2126	82	Body	Smooth	Smooth	Calcareous	20.4	8.1	1	STP	11
66-08-2126	83	Body	Smooth	Smooth	Calcareous	17.8	10.1	1	STP	11
66-08-2126	84	Body	Smooth	Smooth	Calcareous	14.4	6.2	1	STP	11
66-08-2126	85	Body	Smooth	Smooth	Calcareous	18.6	7.6	1	STP	11
66-08-2126	86	Body	Smooth	Smooth	Calcareous	18.1	11	1	STP	11
66-08-2126	87	Body	Smooth	Smooth	Calcareous	18.8	7.7	1	STP	11
66-08-2126	88	Body	Indeterminate	Smooth	Indeterminate	13.7	7.5	1	STP	11
66-08-2126	89	Body	Indeterminate	Smooth	Calcareous	18.1	9.7	1	STP	11
66-08-2126	90	Body	Indeterminate	Smooth	Calcareous	13.6	9	1	STP	11
66-08-2126	91	Body	Smooth	Smooth	Calcareous	13	10.8	1	STP	11
66-08-2126	92	Body	Indeterminate	Smooth	Calcareous	19.1	7.8	1	STP	11
66-08-2126	93	Body	Smooth	Smooth	Calcareous	15.1	7.7	1	STP	11
66-08-2126	94	Body	Smooth	Smooth	Calcareous	15.7	8.8	1	STP	11
66-08-2126	95	Body	Indeterminate	Smooth	Indeterminate	13.5	7.7	1	STP	11
66-08-2126	96	Body	Smooth	Smooth	Calcareous	25.4	6.6	1	STP	11
66-08-2126	97	Body	Indeterminate	Smooth	Indeterminate	13.2	8.4	1	STP	11
66-08-2126	98	Body	Smooth	Smooth	Calcareous	15.1	6.6	1	STP	11
66-08-2126	99	Body	Smooth	Smooth	Calcareous	13.2	8.1	1	STP	11
66-08-2126	100	Body	Smooth	Smooth	Calcareous	13.4	7.1	1	STP	11
66-08-2126	101	Body	Indeterminate	Smooth	Calcareous	9.1	7.6	1	STP	11

66-08-2126	102	Body	Smooth	Smooth	Calcareous	13	7.5	1	STP	13
66-08-2126	103	Body	Smooth	Smooth	Calcareous	22.6	7.3	1	STP	13
66-08-2126	104	Body	Smooth	Smooth	Calcareous	13.3	5.7	1	STP	13
66-08-2126	105	Body	Smooth	Smooth	Calcareous	14.6	9.1	1	STP	13
66-08-2126	106	Body	Smooth	Smooth	Calcareous	11	8.2	1	STP	13
66-08-2126	107	Body	Smooth	Smooth	Calcareous	25.5	10.4	1	STP	13
66-08-2126	108	Body	Scraped	Smooth	Calcareous	29.9	9.9	1	STP	10
66-08-2126	109	Body	Smooth	Smooth	Calcareous	18.9	13.6	1	STP	10
66-08-2126	110	Body	Smooth	Indeterminate	Calcareous	15.3	7.5	1	STP	10
66-08-2126	111	Body	Smooth	Smooth	Calcareous	15	8.2	1	STP	10
66-08-2126	112	Body	Indeterminate	Smooth	Indeterminate	8.6	8.6	1	STP	10
66-08-2126	113	Body	Smooth	Smooth	Indeterminate	9.2	5.7	1	STP	10
66-08-2126	114	Body	Smooth	Smooth	Calcareous	18.1	9.1	1	STP	12
66-08-2126	115	Body	Smooth	Smooth	Calcareous	27.7	9.5	1	STP	12
66-08-2126	116	Body	Indeterminate	Smooth	Calcareous	21.5	8.2	1	STP	12
66-08-2126	117	Body	Smooth	Smooth	Calcareous	15.1	10.2	1	STP	12
66-08-2126	118	Body	Smooth	Smooth	Calcareous	12	7.6	1	STP	12
66-08-2126	119	Body	Indeterminate	Smooth	Indeterminate	12.3	8.1	1	STP	12
66-08-2126	120	Body	Smooth	Smooth	Indeterminate	15.4	8	1	STP	12
66-08-2126	121	Body	Smooth	Smooth	Indeterminate	10.4	6	1	STP	12
66-08-2126	122	Body	Smooth	Smooth	Calcareous	12.1	6.6	1	STP	12
66-08-2126	123	Body	Smooth	Smooth	Calcareous	24	8.5	1	STP	12
66-08-2127	1	Body	Scraped	Smooth	Indeterminate	36.1	14.3	0	General Surface	N/A
66-08-2127	2	Body	Scraped	Smooth	Calcareous	27.5	9.3	0	General Surface	N/A
66-08-2127	3	B NOS	Smooth	Smooth	Calcareous	71.3	15.4	1	General Surface	N/A
66-08-2127	4	Body	Smooth	Smooth	Indeterminate	24.6	8.3	0	General Surface	N/A
66-08-2127	5	Body	Mat Impressed	Smooth	Indeterminate	33.8	9.3	0	General Surface	N/A
66-08-2127	6	Body	Smooth	Smooth	Indeterminate	35.7	14.4	0	General Surface	N/A
66-08-2127	7	Body	Smooth	Smooth	Indeterminate	21	8.1	0	General Surface	N/A
66-08-2127	8	Body	Smooth	Smooth	Indeterminate	18.7	10.6	0	General Surface	N/A
66-08-2127	9	Body	Smooth	Smooth	Indeterminate	23.7	10.2	0	General Surface	N/A
66-08-2127	10	Body	Smooth	Smooth	Indeterminate	27.6	11.2	0	General Surface	N/A
66-08-2127	11	Body	Smooth	Smooth	Indeterminate	43.1	13	0	General Surface	N/A
66-08-2127	12	Body	Smooth	Smooth	Indeterminate	16.5	9.3	0	General Surface	N/A

66-08-2127	13	Body	Smooth	Smooth	Indeterminate	47.6	10.3	0	General Surface	N/A
66-08-2127	14	B NOS	Smooth	Smooth	Indeterminate	17	14.4	1	General Surface	N/A
66-08-2127	15	B NOS	Smooth	Smooth	Calcareous	29.1	12.6	1	General Surface	N/A
66-08-2127	16	B NOS	Combed	Smooth	Calcareous	37.5	15.4	1	General Surface	N/A
66-08-2127	17	Body	Smooth	Smooth	Indeterminate	23.9	17.8	0	General Surface	N/A
66-08-2127	18	Body	Smooth	Smooth	Indeterminate	17.3	7.8	0	General Surface	N/A
66-08-2127	19	Body	Smooth	Smooth	Indeterminate	18.6	7.1	0	General Surface	N/A
66-08-2127	20	B NOS	Smooth	Smooth	Indeterminate	38.9	16.9	0	General Surface	N/A
66-08-2127	21	Body	Smooth	Smooth	Indeterminate	29.4	7.4	0	General Surface	N/A
66-08-2127	22	Body	Smooth	Smooth	Indeterminate	14.8	6.8	0	General Surface	N/A
66-08-2127	23	B NOS	Smooth	Smooth	Indeterminate	43.8	16.5	0	General Surface	N/A
66-08-2127	24	Body	Smooth	Smooth	Indeterminate	28.8	12.7	0	General Surface	N/A
66-08-2127	25	Body	Smooth	Smooth	Indeterminate	29.8	9	0	General Surface	N/A
66-08-2127	26	Body	Smooth	Smooth	Indeterminate	23.5	9.8	0	General Surface	N/A
66-08-2127	27	B NOS	Smooth	Smooth	Calcareous	22.5	13.7	1	General Surface	N/A
66-08-2127	28	Body	Smooth	Smooth	Indeterminate	33	13.8	0	General Surface	N/A
66-08-2127	30	Body	Smooth	Smooth	Indeterminate	22.1	9.6	0	General Surface	N/A
66-08-2127	31	Body	Smooth	Smooth	Indeterminate	30.9	9	0	General Surface	N/A
66-08-2127	32	Body	Smooth	Smooth	Indeterminate	13.8	6.8	0	General Surface	N/A
66-08-2127	33	Body	Smooth	Smooth	Indeterminate	16.6	8.9	0	General Surface	N/A
66-08-2127	34	Body	Smooth	Smooth	Indeterminate	10.2	8.9	0	General Surface	N/A
66-08-2127	35	B NOS	Smooth	Scraped	Indeterminate	34.9	14.8	0	General Surface	N/A
66-08-2127	36	Body	Smooth	Scraped	Indeterminate	29.5	7.3	0	General Surface	N/A
66-08-2127	37	B NOS	Smooth	Scraped	Indeterminate	46	15.9	0	General Surface	N/A
66-08-2127	38	B NOS	Smooth	Smooth	Calcareous	39	16.1	1	General Surface	N/A
66-08-2127	40	Body	Smooth	Indeterminate	Indeterminate	14.5	8.6	0	General Surface	N/A
66-08-2127	41	B NOS	Combed	Smooth	Calcareous	42	16.4	1	General Surface	N/A
66-08-2127	42	B NOS	Smooth	Smooth	Indeterminate	41.8	17	1	General Surface	N/A
66-08-2127	43	Body	Smooth	Smooth	Indeterminate	21.1	8.5	0	General Surface	N/A
66-08-2127	44	Body	Indeterminate	Smooth	Indeterminate	19.6	7.4	0	General Surface	N/A
66-08-2127	45	B NOS	Combed	Other	Calcareous	60	16.4	1	General Surface	N/A
66-08-2127	46	Body	Indeterminate	Smooth	Indeterminate	37.8	8.6	0	General Surface	N/A
66-08-2127	47	Body	Indeterminate	Smooth	Indeterminate	21.7	6.6	0	General Surface	N/A
66-08-2127	48	Body	Smooth	Smooth	Indeterminate	14.9	6.7	0	General Surface	N/A

66-08-2127	49	B NOS	Smooth	Smooth	Calcareous	40.9	14.4	1	General Surface	N/A
66-08-2127	50	Body	Indeterminate	Smooth	Indeterminate	19.9	9.3	0	General Surface	N/A
66-08-2127	51	Body	Smooth	Smooth	Indeterminate	28	8.7	0	General Surface	N/A
66-08-2127	52	Body	Smooth	Smooth	Indeterminate	14.5	7.4	0	General Surface	N/A
66-08-2127	53	Body	Smooth	Smooth	Indeterminate	29.3	10.9	0	General Surface	N/A
66-08-2127	54	Body	Smooth	Smooth	Indeterminate	22.4	10.2	0	General Surface	N/A
66-08-2127	55	B NOS	Smooth	Smooth	Mixed	51.4	19.4	1	General Surface	N/A
66-08-2127	56	Body	Smooth	Smooth	Indeterminate	12.3	7.4	0	General Surface	N/A
66-08-2127	57	B NOS	Smooth	Smooth	Calcareous	37.8	20.8	1	General Surface	N/A
66-08-2127	58	Body	Smooth	Smooth	Indeterminate	17.5	7.7	0	General Surface	N/A
66-08-2127	59	Body	Smooth	Indeterminate	Indeterminate	15.4	6.8	0	General Surface	N/A
66-08-2127	60	B NOS	Smooth	Indeterminate	Calcareous	72.3	24.2	1	General Surface	N/A
66-08-2127	61	Body	Smooth	Smooth	Indeterminate	11.8	5.5	0	General Surface	N/A
66-08-2127	62	Body	Smooth	Indeterminate	Indeterminate	12	10.4	0	General Surface	N/A
66-08-2127	63	Body	Smooth	Smooth	Indeterminate	10.6	5.6	0	General Surface	N/A
66-08-2127	64	Body	Smooth	Smooth	Indeterminate	14.9	7	0	General Surface	N/A
66-08-2127	65	B NOS	Smooth	Smooth	Calcareous	60.4	25.7	1	General Surface	N/A
66-08-2127	67	Body	Indeterminate	Smooth	Indeterminate	27.2	12.5	0	General Surface	N/A
66-08-2127	68	B NOS	Smooth	Smooth	Calcareous	44.8	22.2	1	General Surface	N/A
66-08-2127	71	Body	Smooth	Smooth	Indeterminate	16.8	7.4	0	General Surface	N/A
66-08-2127	72	Body	Smooth	Smooth	Indeterminate	28.9	9.8	0	General Surface	N/A
66-08-2127	73	Body	Smooth	Smooth	Indeterminate	31.6	11	0	General Surface	N/A
66-08-2127	74	Body	Smooth	Indeterminate	Indeterminate	32.4	13.8	0	General Surface	N/A
66-08-2127	75	B NOS	Smooth	Indeterminate	Calcareous	35.4	12.3	1	General Surface	N/A
66-08-2127	76	Body	Smooth	Smooth	Indeterminate	16.8	10.9	0	General Surface	N/A
66-08-2127	77	Body	Smooth	Smooth	Indeterminate	37.7	7.5	0	General Surface	N/A
66-08-2127	78	Body	Smooth	Smooth	Indeterminate	31.4	13.4	0	General Surface	N/A
66-08-2127	79	B NOS	Smooth	Smooth	Indeterminate	28.4	18.4	0	General Surface	N/A
66-08-2127	81	B NOS	Smooth	Smooth	Indeterminate	32.6	12.4	1	General Surface	N/A
66-08-2127	82	Body	Smooth	Smooth	Indeterminate	25.5	14.4	0	General Surface	N/A
66-08-2127	83	B NOS	Corrugated	Smooth	Indeterminate	25.5	15.9	1	General Surface	N/A
66-08-2127	84	Body	Smooth	Smooth	Indeterminate	24	9.3	0	General Surface	N/A
66-08-2127	85	B NOS	Smooth	Smooth	Calcareous	33	17.1	1	General Surface	N/A
66-08-2127	87	Body	Combed	Smooth	Indeterminate	25.1	8	0	General Surface	N/A

66-08-2127	88	Body	Smooth	Smooth	Calcareous	17.6	6.5	0	General Surface	N/A
66-08-2127	89	Body	Indeterminate	Smooth	Calcareous	26.7	7.6	0	General Surface	N/A
66-08-2127	90	Body	Smooth	Smooth	Indeterminate	16.2	11	0	General Surface	N/A
66-08-2127	91	Body	Smooth	Smooth	Calcareous	23.8	9.8	1	STP	14
66-08-2127	93	Body	Smooth	Smooth	Calcareous	14.6	11.4	1	STP	13
66-08-2127	94	Body	Indeterminate	Smooth	Calcareous	13.9	12.7	1	STP	18
66-08-2127	95	Body	Combed	Smooth	Calcareous	14.5	8.6	1	STP	18
66-08-2127	96	Body	Combed	Smooth	Calcareous	28.6	8.2	1	STP	18
66-08-2127	97	Unknown	Smooth	Indeterminate	Calcareous	20.4	15.1	1	STP	16
66-08-2127	98	Body	Smooth	Smooth	Calcareous	19.3	12.7	1	STP	16
66-08-2127	99	Body	Combed	Smooth	Calcareous	27.4	7.8	1	STP	16
66-08-2127	101	Body	Smooth	Smooth	Calcareous	18.4	6.4	1	STP	19
66-08-2127	102	Body	Smooth	Indeterminate	Calcareous	13.1	8.7	1	STP	19
66-08-2127	103	Body	Smooth	Indeterminate	Calcareous	17.2	9.3	1	STP	19
66-08-2127	104	Body	Smooth	Indeterminate	Calcareous	17.4	6.9	1	STP	19
66-08-2127	105	Body	Indeterminate	Smooth	Calcareous	12.6	9.6	1	STP	19
66-08-2127	106	Body	Indeterminate	Smooth	Calcareous	18.4	9.7	1	STP	24
66-08-2127	107	Body	Smooth	Smooth	Calcareous	14.6	7.4	1	STP	24
66-08-2127	108	Body	Indeterminate	Smooth	Calcareous	19.7	8.2	1	STP	24
66-08-2127	112	Body	Smooth	Smooth	Indeterminate	21.1	10.8	0	General Surface	N/A
66-08-2127	113	Body	Smooth	Smooth	Indeterminate	24.7	9.4	0	General Surface	N/A
66-08-2127	114	Body	Smooth	Smooth	Calcareous	20.4	8.5	0	General Surface	N/A
66-08-2127	115	Body	Smooth	Smooth	Calcareous	20	6.1	0	General Surface	N/A
66-08-2127	116	Body	Smooth	Smooth	Calcareous	30.8	9.1	0	General Surface	N/A
66-08-2127	117	Body	Smooth	Smooth	Indeterminate	33.8	9.1	0	General Surface	N/A
66-08-2127	118	B Incurvate	Smooth	Smooth	Calcareous	46.8	27.4	1	General Surface	N/A
66-08-2127	119	Body	Smooth	Smooth	Indeterminate	20.5	4.3	0	General Surface	N/A
66-08-2127	120	Body	Smooth	Smooth	Indeterminate	27	10.4	0	General Surface	N/A
66-08-2127	121	B NOS	Smooth	Smooth	Calcareous	32.8	15.7	1	General Surface	N/A
66-08-2127	122	Body	Smooth	Smooth	Indeterminate	18.9	5.2	0	General Surface	N/A
66-08-2127	123	Body	Smooth	Smooth	Indeterminate	33	6.5	0	General Surface	N/A
66-08-2127	124	B NOS	Smooth	Smooth	Indeterminate	35.8	14.3	1	General Surface	N/A
66-08-2127	125	Body	Smooth	Smooth	Indeterminate	17.6	5.3	0	General Surface	N/A
66-08-2127	126	Body	Smooth	Smooth	Indeterminate	13.5	4.2	0	General Surface	N/A

66-08-2127	127	B NOS	Smooth	Indeterminate	Indeterminate	28.8	10.9	1	General Surface	N/A
66-08-2127	128	Body	Indeterminate	Smooth	Indeterminate	15.8	13.8	0	General Surface	N/A
66-08-2127	129	B NOS	Smooth	Smooth	Calcareous	38.1	15.1	1	General Surface	N/A
66-08-2127	130	B NOS	Smooth	Smooth	Calcareous	24.7	17.7	1	General Surface	N/A
66-08-2127	132	Body	Smooth	Smooth	Indeterminate	20.8	9.4	0	General Surface	N/A
66-08-2127	133	Body	Smooth	Smooth	Indeterminate	34.3	4.7	0	General Surface	N/A
66-08-2127	134	B NOS	Smooth	Smooth	Calcareous	18	13.1	1	General Surface	N/A
66-08-2127	136	B NOS	Combed	Smooth	Calcareous	44.9	12.7	1	General Surface	N/A
66-08-2127	137	Body	Smooth	Smooth	Indeterminate	17.4	10.4	0	General Surface	N/A
66-08-2127	138	B NOS	Indeterminate	Smooth	Calcareous	35.3	13.4	1	General Surface	N/A
66-08-2127	139	Body	Smooth	Smooth	Indeterminate	18.8	8.3	0	General Surface	N/A
66-08-2127	140	Body	Smooth	Smooth	Indeterminate	21.4	10.1	0	General Surface	N/A
66-08-2127	141	Body	Combed	Smooth	Calcareous	34.6	8.4	1	General Surface	N/A
66-08-2127	143	Body	Smooth	Smooth	Indeterminate	22.4	7.9	0	General Surface	N/A
66-08-2127	144	Body	Smooth	Smooth	Indeterminate	20.9	9.5	0	General Surface	N/A
66-08-2127	146	B Incurvate	Indeterminate	Smooth	Calcareous	73.2	27.3	1	General Surface	N/A
66-08-2127	147	B NOS	Indeterminate	Smooth	Calcareous	49.9	19.2	1	General Surface	N/A
66-08-2127	148	Body	Smooth	Smooth	Indeterminate	19.9	8	0	General Surface	N/A
66-08-2127	149	Body	Smooth	Smooth	Indeterminate	20.4	9.4	0	General Surface	N/A
66-08-2127	150	B NOS	Combed	Smooth	Calcareous	40.1	19.7	1	General Surface	N/A
66-08-2127	151	B NOS	Smooth	Smooth	Indeterminate	48	17.4	1	General Surface	N/A
66-08-2127	152	B NOS	Smooth	Smooth	Calcareous	40.4	14.6	1	General Surface	N/A
66-08-2127	153	B Incurvate	Smooth	Smooth	Calcareous	67.9	26.2	1	General Surface	N/A
66-08-2127	154	Body	Smooth	Smooth	Indeterminate	18.9	12.8	0	General Surface	N/A
66-08-2127	155	Body	Smooth	Smooth	Indeterminate	38.5	12.5	0	General Surface	N/A
66-08-2127	156	B NOS	Smooth	Smooth	Indeterminate	28.4	14.8	1	General Surface	N/A
66-08-2127	157	B NOS	Smooth	Smooth	Indeterminate	22.8	13.7	1	General Surface	N/A
66-08-2127	158	Body	Smooth	Smooth	Indeterminate	15.2	9.3	0	General Surface	N/A
66-08-2127	159	Body	Smooth	Smooth	Indeterminate	24	12.6	0	General Surface	N/A
66-08-2127	160	Body	Smooth	Smooth	Indeterminate	40.7	8.3	0	General Surface	N/A
66-08-2127	161	Body	Smooth	Smooth	Indeterminate	29.8	10.1	0	General Surface	N/A
66-08-2127	162	B NOS	Combed	Smooth	Calcareous	32.2	18.8	1	General Surface	N/A
66-08-2127	163	B NOS	Smooth	Smooth	Calcareous	54.1	16.2	0	General Surface	N/A
66-08-2127	164	Body	Smooth	Smooth	Indeterminate	22.6	8.3	0	General Surface	N/A

66-08-2127	165	Body	Smooth	Smooth	Indeterminate	17	12.3	0	General Surface	N/A
66-08-2127	166	Body	Smooth	Smooth	Indeterminate	19.1	8.8	0	General Surface	N/A
66-08-2127	167	Body	Smooth	Smooth	Indeterminate	13.9	9.2	0	General Surface	N/A
66-08-2127	168	Body	Smooth	Smooth	Indeterminate	22.2	8.2	0	General Surface	N/A
66-08-2127	169	Body	Smooth	Smooth	Indeterminate	22.5	10.1	0	General Surface	N/A
66-08-2127	170	Body	Smooth	Smooth	Indeterminate	19	5.9	0	General Surface	N/A
66-08-2127	171	Body	Smooth	Smooth	Indeterminate	19.2	13	0	General Surface	N/A
66-08-2127	172	B NOS	Smooth	Smooth	Calcareous	72	17.7	1	General Surface	N/A
66-08-2127	173	Body	Smooth	Smooth	Indeterminate	59.7	10.9	0	General Surface	N/A
66-08-2127	174	Body	Smooth	Smooth	Indeterminate	26.2	11.2	0	General Surface	N/A
66-08-2127	175	Body	Smooth	Indeterminate	Indeterminate	18.4	7.6	0	General Surface	N/A
66-08-2127	176	Body	Smooth	Smooth	Calcareous	13.8	6.7	1	STP	21
66-08-2127	177	Body	Combed	Smooth	Calcareous	18.2	8.7	1	STP	21
66-08-2127	178	Body	Combed	Smooth	Indeterminate	20.1	7.3	1	STP	21
66-08-2127	179	Body	Smooth	Smooth	Indeterminate	19.1	9.1	1	STP	21
66-08-2127	180	Body	Combed	Smooth	Indeterminate	15	8.1	1	STP	21
66-08-2127	181	Body	Indeterminate	Smooth	Indeterminate	12.7	12.6	1	STP	21
66-08-2127	182	Body	Combed	Smooth	Indeterminate	19.7	8	1	STP	21
66-08-2127	183	Body	Smooth	Smooth	Indeterminate	14.8	9.3	1	STP	21
66-08-2127	200	B NOS	Smooth	Smooth	Calcareous	40.1	17.8	1	General Surface	N/A
66-08-2127	201	Body	Smooth	Smooth	Indeterminate	32.6	9.6	0	General Surface	N/A
66-08-2127	202	Body	Smooth	Smooth	Indeterminate	33.6	15	0	General Surface	N/A
66-08-2127	203	B NOS	Smooth	Smooth	Calcareous	47.7	14.4	1	General Surface	N/A
66-08-2127	204	Body	Smooth	Smooth	Indeterminate	25.6	10.1	0	General Surface	N/A
66-08-2127	205	Body	Smooth	Smooth	Indeterminate	13.9	14.2	0	General Surface	N/A
66-08-2127	206	Body	Indeterminate	Smooth	Indeterminate	13.5	11.9	0	General Surface	N/A
66-08-2127	207	Body	Smooth	Indeterminate	Indeterminate	25.3	10.4	0	General Surface	N/A
66-08-2127	208	B NOS	Indeterminate	Indeterminate	Calcareous	40.5	19.2	1	General Surface	N/A
66-08-2127	209	Body	Smooth	Indeterminate	Indeterminate	28.3	17.3	0	General Surface	N/A
66-08-2127	210	Body	Smooth	Smooth	Indeterminate	26.3	11.4	0	General Surface	N/A
66-08-2127	211	Body	Smooth	Smooth	Indeterminate	43.7	11.2	0	General Surface	N/A
66-08-2127	212	Body	Smooth	Smooth	Indeterminate	25.5	10.6	0	General Surface	N/A
66-08-2127	213	Body	Smooth	Smooth	Indeterminate	23.7	8.8	0	General Surface	N/A
66-08-2127	214	Body	Smooth	Smooth	Indeterminate	17.2	10.8	0	General Surface	N/A

66-08-2127	215	Body	Smooth	Smooth	Indeterminate	28.8	9.7	0	General Surface	N/A
66-08-2127	216	Body	Smooth	Smooth	Indeterminate	20	10.7	0	General Surface	N/A
66-08-2127	217	B NOS	Smooth	Smooth	Calcareous	34.9	16.8	1	General Surface	N/A
66-08-2127	218	B NOS	Smooth	Smooth	Indeterminate	29.1	15.8	1	General Surface	N/A
66-08-2127	219	Body	Combed	Smooth	Indeterminate	43.3	8.1	0	General Surface	N/A
66-08-2127	220	Body	Smooth	Smooth	Indeterminate	24.6	11	0	General Surface	N/A
66-08-2127	221	Body	Scraped	Smooth	Indeterminate	4.5	11.7	0	General Surface	N/A
66-08-2127	223	Body	Smooth	Smooth	Indeterminate	26.7	13.7	0	General Surface	N/A
66-08-2127	224	B NOS	Smooth	Smooth	Calcareous	49	19.2	1	General Surface	N/A
66-08-2127	225	Body	Smooth	Smooth	Indeterminate	31.5	17.7	0	General Surface	N/A
66-08-2127	226	Body	Smooth	Smooth	Indeterminate	31.6	15.4	0	General Surface	N/A
66-08-2127	227	B NOS	Smooth	Smooth	Calcareous	34	15.5	1	General Surface	N/A
66-08-2127	228	Body	Indeterminate	Smooth	Mixed	44.9	17.3	0	General Surface	N/A
66-08-2127	229	Body	Smooth	Smooth	Indeterminate	38	17.5	0	General Surface	N/A
66-08-2127	230	Body	Smooth	Smooth	Indeterminate	22.8	14.8	0	General Surface	N/A
66-08-2127	231	Body	Scraped	Smooth	Indeterminate	30.9	16.6	0	General Surface	N/A
66-08-2127	232	Body	Smooth	Smooth	Indeterminate	26.6	16.7	0	General Surface	N/A
66-08-2127	233	B NOS	Indeterminate	Smooth	Calcareous	46.9	17.1	1	General Surface	N/A
66-08-2127	234	Body	Smooth	Smooth	Calcareous	37	17.9	0	General Surface	N/A
66-08-2127	235	Body	Smooth	Smooth	Calcareous	23.8	7.9	0	General Surface	N/A
66-08-2127	236	Body	Indeterminate	Smooth	Indeterminate	25.1	11.8	0	General Surface	N/A
66-08-2127	237	Body	Smooth	Smooth	Indeterminate	20.4	10.2	0	General Surface	N/A
66-08-2127	238	Body	Smooth	Smooth	Indeterminate	15.4	9.2	0	General Surface	N/A
66-08-2127	239	Body	Smooth	Smooth	Indeterminate	25.1	8	0	General Surface	N/A
66-08-2127	240	Body	Smooth	Smooth	Indeterminate	27.2	9.9	0	General Surface	N/A

Appendix IV: Historic Artifact Catalog

Historic Artifacts

Site No	Color	Contents	Base	Finish	Manufacture	Count
66-08-2124	Colorless	Pop/Mineral Water	Round	Crown	Coca-Cola	150+
66-08-2124	Pale Green	Pop/Mineral Water	Round	Crown	Coca-Cola	3
66-08-2124	Amber	Beer/Ale	Round	Crown	AnchorHocking	12
66-08-2124	Amber	Beer/Ale	Round	Crown	OwensIllinois	4
66-08-2124	Amber	Beer/Ale	Round	Crown	Other (Field Notes)	1
66-08-2124	Amber	Beer/Ale	Round	Crown	Other (Field Notes)	1
66-08-2124	Colorless	Vinegar	Round	Small Ext. Thread	OwensIllinois	1
66-08-2124	Amber	Whiskey	Round	Straight Brandy	OwensIllinois	1
66-08-2124	Colorless	Wine/Champaign	Round	Small Ext. Thread	Owens Bottle Co.	1
66-08-2124	Colorless	Medicine	Rounded Rect.	Small Ext. Thread	Owens Bottle Co.	2
66-08-2124	Colorless	Medicine	Blake v1	Small Ext. Thread	OwensIllinois	2
66-08-2124	Colorless	Medicine	Blake v1	Small Ext. Thread	Other (Field Notes)	1
66-08-2124	Colorless	Medicine	Round	Prescription	OwensIllinois	3
66-08-2124	Cobalt	Toiletry	NULL	Wide Ext. Thread	NULL	1
66-08-2124	Amber	Toiletry	Half circle	Small Ext. Thread	NULL	1
66-08-2124	Amber	Medicine	Square	Grooved bead	NULL	1
66-08-2124	Colorless	Medicine	Round	Small Ext. Thread	Other (Field Notes)	1
66-08-2124	Colorless	Undetermined	Rounded Rect.	Small Ext. Thread	Other (Field Notes)	1
66-08-2124	Milkglass	Toiletry	Round	Other	Unknown	1
66-08-2124	Colorless	Medicine	Polygonal	Wide Ext. Thread	Other (Field Notes)	1
66-08-2124	Amber	Medicine	Rounded Rect.	Wide Ext. Thread	Other (Field Notes)	1
66-08-2124	Colorless	Toiletry	Rounded Rect.	Other	Other (Field Notes)	1
66-08-2124	Colorless	Toiletry	Rounded Square	Small Ext. Thread	Other (Field Notes)	1
66-08-2124	Amber	Chemical	Rounded Rect.	Wide Ext. Thread	Other (Field Notes)	1
66-08-2124	Colorless	Undetermined	Round	Wide Ext. Thread	OwensIllinois	1
66-08-2124	Green	Undetermined	Oval	Wide Ext. Thread	OwensIllinois	1
66-08-2124	Colorless	Undetermined	Blake v1	Wide Ext. Thread	Owens Bottle Co.	1
66-08-2124	Colorless	Toiletry	Oval	Wide Ext. Thread	OwensIllinois	1
66-08-2124	Colorless	Toiletry	Round	NULL	Neutraglass	1
66-08-2124	Colorless	Toiletry	Rectangular	Wide Ext. Thread	NULL	1

Appendix V: Isolated Artifacts

Isolates

Isolate No.	Date	Northing	Easting	Cultural Material
ISO 1	5/27/06	1503337	273904	1 stone adze
ISO 2	5/27/06	1503244	273927	1 ceramic sherd
ISO 3	7/3/06	1503382	273907	2 shell
ISO 4	7/3/06	1503616	273817	1 ceramic sherd
ISO 5	7/5/06	1503189	274074	1 ceramic sherd
ISO 6	7/3/06	1503583	273941	1 ground stone
ISO 7	7/3/06	1503494	274072	1 ceramic sherd
ISO 8	6/14/06	1503263	274328	2 ceramic sherds
ISO 9	6/14/06	1503387	274330	1 ceramic sherd
ISO 10	6/29/06	1503427	273771	1 ceramic sherd
ISO 11	6/14/06	1503358	274368	1 ceramic sherd
ISO 12	6/14/06	1503277	274402	1 ceramic sherd
ISO 13	6/16/06	1503544	274620	5 ceramic sherds

Appendix VI: Project Research Design

1.0 INTRODUCTION

Cultural resource investigations will be conducted prior to the implementation of proposed beddown and support of military training initiatives at Northwest Field and establishment of ISR/Strike Task Force at Andersen Air Force Base (AFB), Guam. This document provides an interpretive framework for the proposed cultural resources investigations. All fieldwork and reporting procedures, and all academic and experiential qualifications of professional personnel working on the project, will meet or exceed the Secretary of the Interior's Historic Preservation Professional Qualification Standards as specified in Section 112(a)(1)(A) and 112(a)(1)(B) of the National Historic Preservation Act (NHPA) of 1966, as amended. Standard Operating Procedures defined in the base's Integrated Cultural Resource Management Plan (ICRMP) (International Archaeological Research Institute 2003) will also be observed.

The proposed Area of Potential Effect (APE) is approximately 410 acres distributed over four areas of variable size: 1) a 137-acre administrative area, 2) a nine-acre Field Training Exercise FTX area, and 3) a 14-acre bivouac area, all associated with the deployment of RED HORSE Squadron and associated units and training requirements and; 4) a 210-acre Aircraft Storage Area (ASA), associated with ISR/Strike Force deployment. The APE includes some areas that have been inventoried previously for cultural resources in the 1980s. These previously investigated areas will not be included in the present inventory, though any previously recorded sites within these areas will be revisited and reevaluated for National Register of Historic Places (NRHP) eligibility.

The purpose of this study is to fulfill requirements by the Department of Defense (DoD) to assess the impacts of any proposed undertaking on historic properties as directed by the National Environmental Policy Act (NEPA) of 1969 (PL 91-190) and Section 106 of the NHPA, of 1966, as amended. These objectives will be accomplished through a systematic inventory and evaluation of all cultural resources, sufficient in scope and detail to determine NRHP eligibility of all sites identified within the proposed APE. The protection, compliance and stewardship roles of the Federal land managers, including the

Air Force, in regard to historic preservation is also addressed in the Archeological Resources Protection Act (ARPA) of 1979.

Of the laws listed above, the NHPA is the most significant for protecting cultural resources. Parts 106 and 110 of the NHPA are relevant to the present project. Section 106 requires that Federal land managers assess the effects of proposed undertakings on properties that are eligible for NRHP inclusion; Section 110 requires that Federal land managers inventory cultural resources on properties under their jurisdiction. All properties that are determined eligible for listing on the NRHP must be preserved or, if preservation is impossible, subjected to controlled data recovery to mitigate potential project impacts.

This proposed project fulfills requirements of the cultural and natural resources program at Andersen AFB, as enumerated in the base ICRMP. Specifically, the 36th Civil Engineer Squadron (CES) is given responsibility for “maintaining cultural resources to prevent significant deterioration, and ensure that such properties are not...demolished or substantially altered” (International Archaeological Research Institute. 2003: 11).

2.0 NATIONAL REGISTER ELIGIBILITY CRITERIA

The qualification of a cultural resources site as eligible for listing in the NRHP (i.e., a historic property) is judged in relation to four criteria for evaluation defined by 36 Code of Federal Regulations (CFR) Part 60. Subsequent to the identification of relevant historical themes and related research questions, these four criteria are applied:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess *integrity* of location, design, setting, materials, workmanship, feeling, and association, *and*

- (a) That are *associated with events* that have made a significant contribution to the broad patterns of our history; *or*
- (b) That are *associated with the lives* of persons significant in our past; *or*
- (c) That *embody the distinctive characteristics* of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- (d) That *have yielded, or may be likely to yield, information important in prehistory or history*

[36 CFR § 60.4, emphasis added].

The application of these criteria differ somewhat between prehistoric resources, which are usually assessed under Criterion D, and historic resources, which may be assessed under a broader array of criteria. Assessment of prehistoric resources is discussed first, then assessment of historic resources.

The goal of prehistoric archaeological research and management is to fill gaps in our knowledge about specific research domains. Scientific importance is partially driven by the research paradigms of the time and in part by the amount of information available about a particular research topic in a specific geographic area. The most robust forms of scientific importance should honor diverse and occasionally competing schools of research interests and their attendant approaches (including cultural-historical, processual or ecological, and post-processual paradigms). A cultural site's scientific value is assessed under Criterion D.

Criterion D: resources that have yielded, or may be likely to yield, information important in prehistory or history [36 CFR § 60.4]. This criterion addresses scientific importance (Butler 1987) and applies primarily to prehistoric sites, and only in specific instances to historic sites. In order to fulfill Criterion D, a site must possess certain attributes, such as intact buried cultural strata with functionally and temporally diagnostic materials, datable cultural features, and so on, such that further intensive research at the site could be expected to add additional information to applicable research questions.

Approaches used to assess the importance of historic-era resources of the last 150 years differ from those applied to the prehistoric period due to the existence of historical records and classes of mass-produced artifacts, many of which are datable. Although many of the research domains for the prehistoric component (assessed through National Register Criterion D) can also be applied to historic period resources with substantive material content, more robust criteria may also be applied, where warranted. Most appropriate of the four criteria to the evaluation of the historic-period resources at Andersen AFB are National Register Criteria A and C, followed by Criterion B.

Criterion A: resources that are associated with events that have made a significant contribution to the broad patterns of our history [36 CFR § 60.4]. Such resources most easily relate to the early exploration and European colonization of Guam; the transition from Spanish to American administration; the capture of the island by Japanese forces and its subsequent re-capture by U.S. Forces during WWII; and the island's subsequent role in Cold War era military operations. It is most appropriate to assess buildings and features in the context of these broad historical patterns. Although often interpreted broadly, this criterion stresses that to achieve significance a site must be associated with events that made a significant contribution to a pattern of history and not simply associated loosely with a general theme that defines a historical pattern such as colonization.

Criterion C: resources that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose

components may lack individual distinction [36 CFR § 60.4]. Sites that embody the style or technology of traditional Chamorro structures, Spanish colonial buildings, modes of transportation, and the kinds of military buildings and support facilities used more than 50 years ago may be regarded as potentially eligible National Register properties. Assessment is dependent upon documenting the distinctiveness of a style or technique.

Criterion B: resources that are associated with the lives of persons significant in our past [36 CFR § 60.4]. This criterion is the least likely of the four National Register criteria to apply to historic-era resources at Andersen Air Force Base. Such properties would include specific buildings or features occupied or developed by individuals known to have been important in social, economic, political, military, or technological development at the local, regional, or national level.

As both prehistoric and historic research progresses within a region, well-excavated sites contribute information to some research domains. Through time, data needs for some research questions may be addressed to various degrees, even though complementary data are often needed from different periods, seasons of occupation, settings, and site types to fully understand the diversity of activities. As data required for addressing specific questions approach redundancy, the potential importance of sites containing only those types of data may diminish. This suggests that the identification criteria of important historic properties are tied to both a specific geographical area reflecting a cultural adaptation or region and a state of accumulated knowledge about a research domain topic. Furthermore, the criteria and priorities of important sites are apt to shift as paradigms change or as data accumulations approach redundancy. Such shifts usually occur over a long period of time. Archaeological sites that retain integrity and contain artifacts and features capable of contributing information toward addressing a research issue are regarded as significant and are worthy of listing in the NRHP.

3.0 RESEARCH DOMAINS FOR CULTURAL PROPERTIES

The ultimate goal of all cultural resources investigations is to provide answers to regional research questions. In the case of Andersen Air Force Base, the most concrete research questions center on adaptive patterns associated with the exploitation of the island's northern limestone shelf and its associated ecosystems. This upland interior region of limestone forests is poorly investigated archaeologically in comparison to coastal areas and mountainous settings in the island's southern region. An understanding of adaptive patterns specific to the current project area can be gained through collection of information that is relevant to the types of resources and environmental setting expected in the study.

Previous surveys by Kurashina et al. (1987) and Haun (1989) indicate that the most commonly encountered site types in the Northwest Field area are likely to be small ceramic scatters. Kurashina's inventory recovered 148 Latte period sherds from 17 sites; Haun reports 23 Latte period plain sherds from a single site. These sites were often less than 50 m² in area. More recent work by PHRI in the Munitions Storage Area (MSA) near the ASA indicates a higher site density and a greater diversity of artifact and feature types, as well as larger sites, in that portion of the APE (DeFant 2005). A survey by IIARI in an area between the MSA and the Northwest Field recovered numerous lusong in addition to Latte period ceramics and other materials (Yee et al. 2004). In all of these areas soils rarely exceed about 30 cm in depth, making the probability of encountering stratified deposits unlikely.

Negative surveys are also reported for fairly large areas within Andersen AFB (Davis 1983, Tuggle 1992), indicating considerable variability in site density and/or preservation. Currently, only one archaeological site (Site 06-08-0014) on Andersen AFB is listed on the NRHP.

The application of research questions to archaeological data sets aids in defining the attributes that underlie site significance. Sites that have defined integrity—either as brief single component occupations or multicomponent sites, are most worthy of protection. In general, those sites with physical integrity and materials capable of addressing research domain issues are regarded as important.

Research questions for this project derive from general research concerns summarized in the Andersen AFB ICRMP, and an assessment of the types of research domains that could realistically be addressed for the types of cultural properties expected to occur in the project area. For management purposes, Andersen AFB is divided into nine Cultural Resource Management Areas (CRMAs), based on land use, topography, and sensitivity for the occurrence of significant historic properties. The current project affects portions of CRMAs III, IV, VII, and VIII. While considerable research potential is noted for pre-Latte period coastal sites along the base's eastern margin within CRMA IX, limited research potential is expected for archaeological sites on the limestone plateau, where the current project area is located (although CRMA IV is considered a sensitive area for cultural resources).

With regard to sites in CRMA IX, the ICRMP notes potential to investigate early village sizes, degree of permanency, the subsistence base, and population growth (International Archaeological Research Institute 2003: 31). Detailed analysis of ceramic artifacts is also recommended. The proposed research domains for this project recognize that the sites recorded on the limestone plateau are likely to be associated with larger coastal settlements within CRMA IX and elsewhere along the coastal shelf. Consequently, it may be possible to address some of the general research concerns outlined in the ICRMP, particularly with regard to subsistence activities and population dynamics, through spatial and material analysis of sites on the limestone plateau.

Given the apparent contrasts in documented site size, density, and complexity, and the small likelihood of encountering stratified sites, an effective research design should focus on topics that can be addressed through 1) the spatial patterning of artifacts within sites,

2) the distribution of sites across the study area, and 3) covariance between environmental and cultural attributes. These data can be used in concert to define settlement, subsistence, and technological pattern indicators within the sample of sites on the limestone plateau, and potentially do address their relationship to surrounding coastal settlements.

Each of these indicators must be placed in a temporal as well as spatial context to provide meaningful interpretation. Without some control over the age of archaeological remains either from direct association with dated materials or conclusive correlation to diagnostic tool forms previously recovered in datable contexts, the development of cultural historic sequences cannot be addressed. Four research domains are defined for the current project (with the Technology domain further divided into two sub-categories):

- Chronology
- Technology
 - Reductive Technology (shell, bone, lithics)
 - Ceramic Technology
- Subsistence Activities
- Settlement Patterns

Specific goals, research questions, and data needs for each of these domains are discussed below and summarized in Table 1. Data collection and analytic methods are proposed specifically to facilitate rapid, accurate, and consistent data recovery and management in support of the project research domains, as well as other aspects of site management and documentation. These methods are discussed in detail in the following chapter.

3.1 CHRONOLOGY

Sites that possess absolutely or relatively dated materials are regarded as more important than those that do not possess such materials. Ceramic artifacts are the primary indicators of relative chronology on sites of the limestone plateau (specific species of fish

Table 1. Summary of Research Domains.

<i>Domain</i>	<i>Research Question</i>	<i>Dataset</i>
Chronology	Does settlement and exploitation of the upland limestone forest represent a single temporal range (Latte period) or are earlier (and/or later traditional Chamorro or Spanish colonial) components present that have not yet been recognized?	Information needed to assess chronology includes securely dated feature contexts or stratigraphic contexts (with datable organic materials) and/or temporally sensitive ceramic artifacts.
Reductive Technology	<p>What is the range of raw materials used on sites in the study area?</p> <p>Were lithic materials that occurred in the limestone matrix exploited?</p> <p>Were shells imported to the inland area, either as raw material for tool manufacture or as finished tools, such as <i>tridacna</i> shell adzes?</p> <p>What is the diversity of tool types associated with the study area?</p> <p>How do tool kits on the upland plateau compare to those on the adjacent coastal shelf?</p>	<p>Information needed to assess material procurement strategies and production technologies includes identification of the range of tools—ideally from discrete contexts to identify primary and secondary technologies. Identification of the range of feature types onsite to help infer primary or secondary technologies.</p> <p>Information needed to assess functionally discrete tool kits includes discrete tool types and tool kits from different types of sites with single components.</p>
Ceramic Technology	<p>What manufacturing variability occurs within ceramic types?</p> <p>What variability occurs in surface treatment within ceramic types and does it reflect manufacturing attributes or social identifiers?</p> <p>Do decorated ceramics demonstrate ethnic group affiliations or regional interaction patterns?</p> <p>How do ceramic assemblages on the limestone plateau compare to those of the surrounding coastal shelf?</p>	Information needed to assess ceramic technology includes adequate samples of ceramic types containing information on temper, inclusions, manufacture (technique [modeling or coil], thickness), surface treatments (both interior and exterior), and decoration.
Subsistence Activities	<p>Did subsistence activities on the limestone plateau focus primarily on cultivated crops, the collection of wild fruits, or both?</p> <p>Were subsistence activities on the limestone plateau intended primarily to augment the food supplies of nearby coastal settlements or did relatively permanent and self-sufficient settlement occur on the limestone plateau during at least part of the year?</p>	<p>Information needed to assess subsistence activities includes identification of charred macrobotanical remains from feature fills; carbon and nitrogen isotope data from residues on and in rocks and pottery; and residues from inside porous burned rocks and pottery.</p> <p>Use-wear data from cutting and scraping tools to validate functions and association of features and tools with identifiable plant remains would be also be valuable.</p>

<i>Domain</i>	<i>Research Question</i>	<i>Dataset</i>
Settlement Patterns	<p>If residential sites can be differentiated from specialized extractive sites, how do their distributions on the landscape differ?</p> <p>If differences in the above distributions are demonstrated, are residential sites consistently associated with a particular subset of environmental conditions?</p>	Information needed to assess regional settlement patterns includes distribution of feature types and tool classes (and inferred behavioral ranges) within sites and comparison of these factors across the site sample; spatial mapping of topographic, geologic, and botanical settings in which sites occur.
Subsistence Systems	<p>What types of subsistence information can be derived from flotation data, if present?</p> <p>What types of subsistence information can be derived from tool kits and wear patterns on individual tools?</p>	Information needed to assess subsistence practices includes preserved floral and faunal remains and food processing tool kits.

and shellfish, which can indicate relative age of a deposit when occurring in a cultural context, based on known patterns of species presence or absence in the past are unlikely to be found). Absolute dates by radiocarbon assay or other means are unlikely given the depositional environment, but these should not be ruled out as a possibility. A majority of ceramic artifacts recovered to date on Andersen AFB are Latte period plain sherds, though a few decorated items are known (Kurashina et al. 1987). The current data suggest all pre-contact occupation of the study area is associated with the Latte period. Given this trend, sites containing indications of earlier, pre Latte period occupations or of Spanish period or Modern, pre-WWII occupations would be of particular interest as they would represent archaeological populations that have not yet been sampled in the study area and could provide temporal contrast to the settlement and technology data.

Assuming a sufficient sample of sites is encountered, with sufficient variability both among and within sites, the following research domains would be examined in relation to the indicators listed above.

3.2 TECHNOLOGY

Technology refers to the manner in which items are made and used. Studies indicate that technology consists of three components: (1) the “organization” or social arrangement of people in performing specific tasks; (2) the “apparatus” or raw materials, tools, and

features needed to conduct specific tasks; and (3) the “techniques” or the culturally transmitted knowledge about the environment and the skills necessary to execute specific tasks. Technology also involves the production of primary tools to make the items necessary for secondary tools and of features needed to transform the natural environment into consumable materials.

Technology involves a component of fabrication, use, rejuvenation, modification, and discard or removal. The challenge in reconstructing technologies is to discern from the remaining assemblage and residues the complete range of activities and processes that occurred onsite. This is best achieved when a site has been occupied briefly and then been buried under conditions of good preservation. It is least possible when preservation is poor and when sites are occupied for long periods of time, which results in severe overprinting by later materials and/or re-use of earlier materials by later occupants. This domain is broken into two sub categories: reductive technology, addressing tool manufacture from stone, bone or shell, and ceramic technology. Technological materials, manufacturing and use patterns can indicate the degree and types of association between upland and coastal sites as well as specific behaviors associated with occupation of the limestone plateau. For instance, were materials imported from the coast for use in specialized task areas on the plateau or was the plateau exploited as a source of materials for coastal sites?

3.3 SUBSISTENCE ACTIVITIES

This research domain addresses the strategies and methods used by prehistoric groups to procure and process plant and animal resources. Subsistence may be regarded as the core of culture on which other cultural adaptations are dependent. This domain requires an understanding of the types of plants and marine and terrestrial animals obtained, the strategies used to procure them, and the methods of processing, cooking, and/or storage. It also requires investigation of the seasonal and spatial availability of specific resources. Inferring the choices that prehistoric groups made in investing time in harvesting plants versus fishing is also a key element of this research domain. Investigation of subsistence patterns also requires discerning between foraging strategies, which move people to

resources, and collecting strategies, which employ task groups to move resources to central camps. With regard to the relationship between coastal settlements and sites on the upland plateau, for instance, it is relevant to ask whether groups began to relocate to upland areas on a permanent or semi-permanent basis as a result of population pressures after the onset of the Latte period, or whether the plateau merely served as a supplemental resource bank for permanent coastal villages.

Examination of site distributions in this regard may reveal more subtle trends. A simple correlation with distance to the cliff edge may be linked to correlations with fresh water sources, travel routes to underlying beaches, etc. Previous surveys indicate considerable variation in site density, though related environmental factors have not yet been suggested. As with all areas on Guam, the impacts of WWII combat and post-war construction and cleanup activities must be taken into account when assessing the distribution of archaeological sites.

4.0 FIELD AND REPORTING METHODS

4.1 FILE REVIEW AND COMPILATION OF EXISTING DATA

A comprehensive synthesis of previous cultural resources work on Andersen Air Force Base will be compiled. This will include a review and summary of all previous site forms and reports, and examination of existing collections. Sources will include Andersen AFB, Guam Historic Preservation Office (GHPO), University of Guam Anthropology Department, and any contractors with collections and other relevant information in their possession.

4.2 FIELD INVENTORY

4.2.1 Inventory Methods

The survey crew will consist of a crew leader, four field technicians, and a GPS specialist. The crew will clear survey transects at 10 m intervals with machetes and chain saws, as needed. The limestone forests are largely devoid of dense ground-covering grasses, and are characterized by shallow sediments and frequent bedrock exposures; shovel testing should not be necessary during the inventory in these areas. In areas of heavy ground cover and/or relatively deep depressions in the limestone shelf where deeper sediments may have accumulated, shovel probing on a regular grid (5 m interval) will be necessary. All shovel tests, either on general transects or on sites, will be 50-x-50- cm units excavated to five culturally sterile 10 cm levels or bedrock, whichever is encountered first.

Sites will be recorded in detail using Mobile Archaeological Recording Kit (MARK 1.0) forms on Window Mobile 2003 handheld devices housed in weather-tight Otterbox containers (Figure 1). The Guam site recording form has been digitized and placed in this format for project use, with an associated relational database.



Figure 1. Dell Axim PPC used inside weatherproof Otterbox container for recording site, artifact, feature, shovel test, and landscape details directly to project databases.

Fields in the general Guam cultural resources database, and associated Access editing forms, used in concert with MARK 1.0, are shown in Appendix 1. In addition, a number of detailed electronic landform, vegetation, shovel test, and cultural material recording forms will be used to supplement and augment the standard site form, and allow accumulation of a detailed database on each site. All pottery sherds, for example, will be recorded as to ware type, temper, exterior and interior surface treatments, and dimensions. Lithic debitage will receive a similar level of detail at the individual artifact level, noting flake type (Sullivan and Rosen typology), material, cortical stage, and size category. Items receiving Field Specimen numbers are recorded in extensive detail and photographed digitally.

Use of the MARK 1.0 facilitates rapid, accurate, and consistent field recording in support of specific research questions as well as general site documentation. Particularly relevant to this project and its proposed research design are focused artifact attribute forms. The ceramics recording form, which can be used simultaneously by multiple crew members on a single site to expedite recording, allows rapid accumulation of large samples, as may occur in the Northwest Field and ASA project areas. Table 2 shows a portion of MARK 1.0 field files for a sample of ceramic artifacts recorded on the Nevada Test and Training Site (NTTS), Nellis AFB.

Table 2. Example of raw ceramic artifact data entered in the field.

FS No.	Ware	Temper	Ext. Treatment	Int. Treatment	Type	Max. Diameter	Max. Thickness	Unit Type	Unit No.	Recorder
57.04	Grayware	Angular Sand	Smooth	Smooth	Body Sherd	2.2	0.7	Alcove	1	M. Johnson
57.05	Brownware	Angular Sand	Smooth	Smooth	Body Sherd	1.1	0.7	Alcove	1	M. Johnson
64.14	Brownware	Angular Sand	Slipped	Smooth	Body Sherd	4.2	0.6	None	N/A	M. Johnson
69.11	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	3.2	0.5	None	N/A	M. Johnson
69.12	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	4.3	0.6	None	N/A	M. Johnson
69.17	Brownware	Angular Sand	Smooth	Scraped	Body Sherd	5.4	0.6	None	N/A	M. Johnson
69.18	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	3.4	0.5	None	N/A	M. Johnson
69.19	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	2.9	0.4	None	N/A	M. Johnson
69.27	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	6.1	0.8	None	N/A	M. Johnson
69.28	Brownware	Angular Sand	Scraped	Smooth	Body Sherd	6.1	0.7	None	N/A	M. Johnson
69.32	Brownware	Angular Sand	Exfoliated/Unknown	Scraped	Body Sherd	4.1	0.4	None	N/A	B. Fallon
69.33	Brownware	Angular Sand	Exfoliated/Unknown	Exfoliated/Unknown	Body Sherd	3	0.4	None	N/A	B. Fallon
69.43	Brownware	Angular Sand	Coiled	Scraped	Plain Rim	4.7	0.7	None	N/A	B. Fallon
69.44	Brownware	Angular Sand	Coiled	Scraped	Plain Rim	3.1	0.6	None	N/A	B. Fallon
69.51	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	2.4	0.6	Ceramic Concentration	1	B. Fallon
69.52	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	4	1.3	Ceramic Concentration	1	B. Fallon
69.53	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	2.1	0.6	Ceramic Concentration	1	B. Fallon
69.54	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	2.5	1	Ceramic Concentration	1	B. Fallon
69.55	Brownware	Angular Sand	Scraped	Scraped	Plain Rim	3.3	0.8	Ceramic Concentration	1	B. Fallon
69.56	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	2.7	0.6	Ceramic Concentration	1	B. Fallon
69.57	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	3.4	0.6	Ceramic Concentration	1	B. Fallon
69.58	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	4.5	0.6	None	N/A	B. Fallon
69.59	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	2.5	0.6	None	N/A	B. Fallon
69.6	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	2.9	0.6	Ceramic Concentration	2	B. Fallon
69.61	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	2.5	0.6	Ceramic Concentration	2	B. Fallon
69.62	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	3	0.7	Ceramic Concentration	2	B. Fallon
69.63	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	3.5	0.7	Ceramic Concentration	2	B. Fallon
69.64	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	3.6	0.7	Ceramic Concentration	2	B. Fallon
69.67	Brownware	Angular Sand	Scraped	Scraped	Body Sherd	5.3	0.5	None	N/A	B. Fallon

This technology allows rapid analysis of incoming field data and is instrumental in detecting significant trends in site samples. By way of example, data taken directly from the MARK 1.0 ceramic artifacts forms on the NTTS revealed a statistically significant split, which was not obvious to recorders due to the large sample size, in the frequencies of scraped versus smooth ceramic exteriors in two survey areas. This trend ultimately was found to relate to broader differences in settlement and land use patterns in the two areas (fall pine nut harvest vs. summer wild seed harvest).

All site photography will be digital, with a minimum resolution of 4 megapixels. Sites will be mapped via *Trimble* Global Positioning System (GPS) receivers supplemented

with scaled sketches as needed. All cultural features will be mapped to scale and photographed.

Architectural sites are not anticipated, other than concrete pads and possible collapsed wooden structures. These will be recorded using standard procedures. Standing buildings, which will be present in a portion of the ASA, will be evaluated by an architectural historian, and photographed in an appropriate format (2 x 2 inch, etc.). Plans and drawings of any buildings or structural complexes, such as historic runways, will be reviewed and integrated into the final documentation.

4.2.2 Artifact Collection, Mapping, and Curation

Since survey will occur only in areas directly impacted by construction, 100 % surface collection of temporally diagnostic artifacts (rim sherds, decorated ceramics, adzes, etc.) is anticipated. Due to the level of detail in which material will be recorded, collection of lithic debitage, plain ceramic body sherds, etc., will not occur and artifacts will be left in situ. All diagnostic artifact locations will be mapped using a collection of not fewer than 25 GPS points at the location, and boundaries of lithic, ceramic, or other non-diagnostic artifact scatters, will be mapped to a tolerance of 10 collection points at each map station on the polygon's perimeter. All GPS field data will be post-processed for sub-meter accuracy. Historic artifacts will be treated in a similar manner. Bottle bases and finishes, maker's marks, etc. will be collected. Boundaries of glass or building material scatters, etc., will be mapped and the contents recorded digitally. A 5-meter range pole and patch antenna will be used to penetrate the forest canopy to ensure accurate GPS reception. Figure 2 is an example of a complex site in topography similar to that of the current project area, mapped using the methods and tolerances described above.

All artifacts recovered from sub-surface contexts (see Section 4.2.3, below) will be collected and curated. Andersen AFB has arranged curatorial space on base, in consultation with GHPO. The archaeological collection may be transferred to the Guam Museum for permanent curation at a later date when space is available.

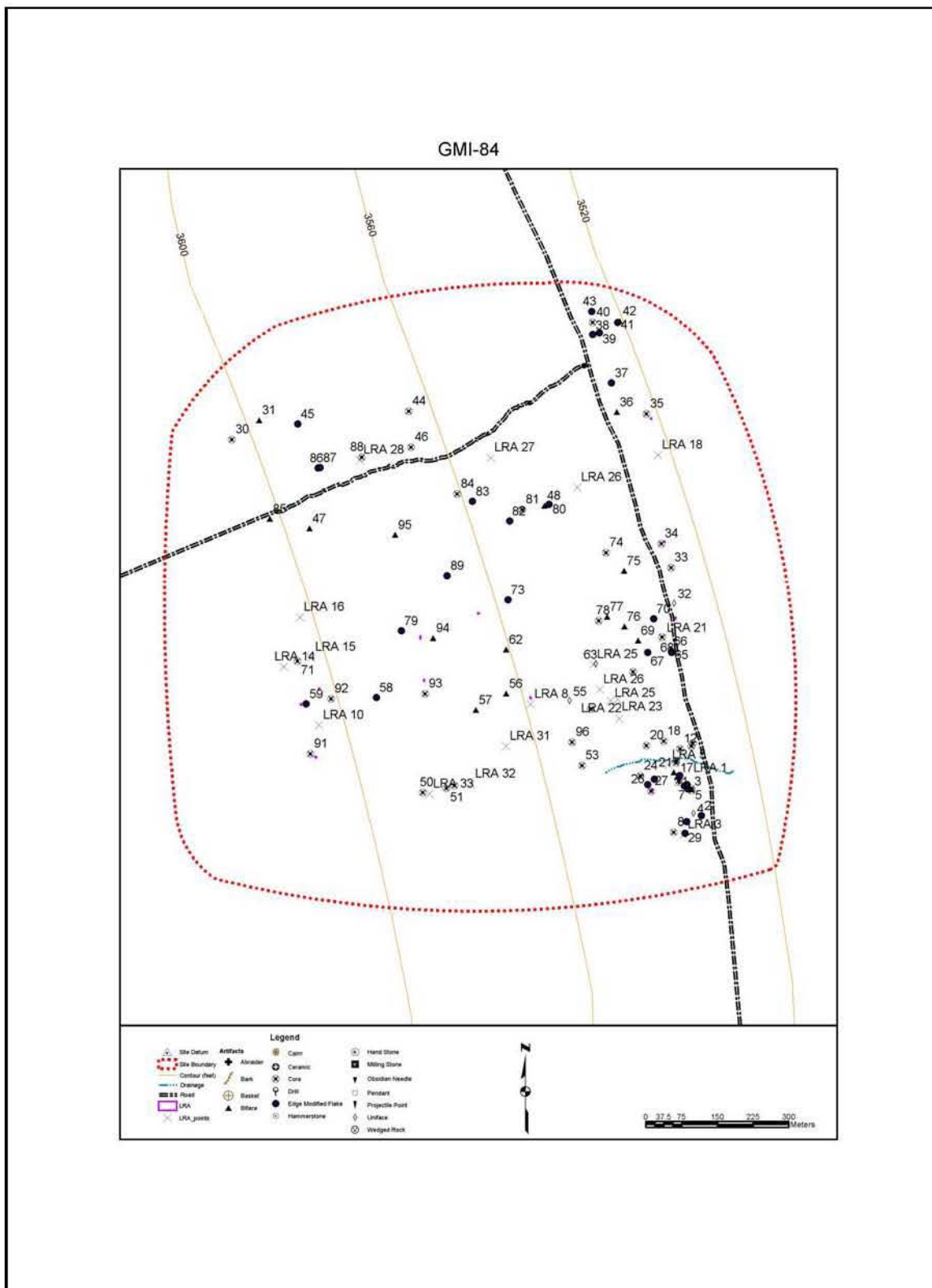


Figure 2. Example of site map produced using the methods and tolerances proposed for this project (image is reduced to fit the current page size).

Collected artifacts will be assessed for the potential to contain diagnostic resins or residues. Those which may contain such material will be sealed to prevent contamination and set aside from the general collection for later analysis by a specialized laboratory. Specimens that are not intended for specialized analysis will be cleaned using water and a soft brush, thoroughly dried, and individually sealed in a ziplock container of appropriate size. A catalog card that contains the following information will accompany each artifact:

- Temporary site number
- Artifact type
- Field Specimen number
- UTM coordinates of collection point
- Collector's name
- Date of collection

If permanent site numbers and accession numbers are available prior to submission of the collected materials to a repository, the permanent site number, Field Specimen number, and accession number will be included on the catalog card and written on the artifact in indelible ink over a layer of acetone. Collected materials will be stored in banker size boxes with a packing list included in each box.

Detailed examination of collected artifacts, including microscopic examination of wear patterns, if warranted, will be carried out. All information gleaned from collected specimens will be included in the project database. A copy of the completed database will be included on a CD with the artifacts when the material is sent to a repository.

A CD containing all digital photographs, photo logs, and field databases, along with any other type of field documentation will be submitted with the archaeological collection for final curation with the completion of the final technical report.

4.2.3 Site Assessment Under Criterion D of 36 CFR 60.4

All cultural properties located during the proposed sample and intensive inventories, and any previously recorded sites within direct impact areas, will be evaluated for eligibility under Criterion D of 36 CFR 60.4. As noted in Section 2.0, this criterion states that a property will be eligible for NRHP inclusion if it contains, or is likely to contain, information that is important to the study or prehistory or history. This is most often interpreted as meaning a site is eligible if further investigation, including excavation and detailed analysis of materials, if it would be likely to produce significant historical and scientific data beyond what is currently known about a particular region or site type.

All archaeological sites that are not located on bedrock exposures will be subjected to shovel probing to determine the likelihood of subsurface cultural components. The shovel test interval will be based on the square root of the site's maximum dimension, and may extend beyond the visible site boundary to ensure that the surface distribution of artifacts or features accurately reflects the potential extent of any subsurface material.

The number of tests will vary in relation to site area, but will be proportionally consistent. Certain sites previously recorded in the project area are only about 3-x-5 meters in area. Such sites would receive four shovel probes; a site measuring 100 x 20 m would receive approximately 12-14 shovel probes, etc. The exact number of shovel probes excavated on a site will be determined both by the site area and the field director's discretion. If the calculated number of probes appears inadequate for a particular site, the field director may place additional probes subjectively to ensure adequate evaluation.

Prehistoric sites located on bedrock will be evaluated based on 1) uniqueness of material content and 2) sites' internal spatial integrity. Sites that contain pre-Latte phase material, which is extremely rare on Andersen AFB, will be considered potentially NRHP-eligible for NRHP inclusion due to their ability to expand our knowledge of pre-Latte settlement and land use systems. Sites that contain obvious and intact activity loci may be

considered NRHP-eligible due to their ability to potentially address questions regarding community structure and taphonomic processes in that region of Guam.

4.2.4 Human Remains

In the unlikely event that human remains are encountered 1) all work in the vicinity of the find will cease, 2) the area will be clearly demarcated with flagging tape, 3) the base commander's office, base security, State Historic Preservation Officer (SHPO), and environmental flight will be contacted. Provided adequate remains are present, a physical anthropologist will determine whether the remains are of prehistoric Chamorro or historic Euro-American or Asian affiliation. Historic remains will be the responsibility of the base security force. Since the Native American Graves Protection and Repatriation Act (NAGPRA) does not apply to natives of Guam, prehistoric remains will be recovered, analyzed, and curated respectfully with other archaeological materials.

4.3 HISTORIC NORTHWEST FIELD DOCUMENTATION

In addition to the effort described above, the historic Northwest Field complex, which is recommended for NRHP inclusion under criteria A and C or 36 CFR 60.4, will be addressed in the project report. This will entail a review and summary of existing documentation and recommendations for future management of the resource.

4.4 DRAFT AND FINAL REPORTS

4.4.1 Draft Report

The draft report shall be a finished, polished, complete report, free of typographical, grammatical, and spelling errors will be submitted within 60 days of completion of fieldwork. The report shall include, but not be limited to, the following sections:

(1) Title Page. Indicates the project name, type of study, location (project name and county), report date, name of Contractor, Principal Investigator(s), and the contract and Task Order number.

(2) Table of Contents, List of Figures, List of Tables, List of Plates.

(3) Management Summary/Abstract. This is a brief synopsis of the work conducted, number and types of cultural resources identified and overall significance, and an overview of the management recommendations.

(4) Foreword.

(5) Background. This section states the problem to be addressed and its impact on the project area. It cites any related previous research and a reason why the current research is being conducted. It should specify who executed the work (Contractors, and partner organizations) and identify the targeted users of the report and/or the technologies.

(6) Approach. This section specifies the research methodology. If the methodology is complex or otherwise warrants a chapter of its own, this section can simply cross-reference the reader to the appropriate chapter.

(7) Research Design. Identify research questions pertaining to the project area's geomorphology, culture history, settlement and subsistence patterns, etc., to which data generated by the survey may be relevant.

(8) Natural Environment of the Study Area. A detailed description of the natural environment of the study corridor including physical features and topography, soils, past and present vegetation and fauna, and past and present land uses.

(9) Cultural Overview and Previous Work. A general outline of prehistoric and historic cultural development on Guam and the Micronesia region and including a table and description of all previous cultural resources investigations conducted within Andersen AFB, names of principal investigators, dates of the studies, study results, and an overview of the general adequacy and deficiencies of the past work.

(10) Field and Laboratory Methods. Present the field procedures used to accomplish the research design. Discuss how the fieldwork was organized, scheduled, and carried out. Detail the laboratory procedures and the methods used to analyze artifacts and other data recovered from the field. Provide operational definitions for all analytical categories and descriptive terms (such as cultural midden, feature, lithic analytical categories, etc.). Provide references to all artifact types and taxonomic units.

(11) Results of Fieldwork. Describe in detail all cultural resources identified by the field investigation and/or the literature search. The information provided in this section shall include, but not be limited to: site name (if any); site number; county; state; site type (lithic scatter, latte set, etc.); component(s) or probable component(s), including temporal/cultural affiliation and technology/function; elevation; description of the topographic position; site size or presumed site size; stratigraphy and depth (if known); present vegetation and ground surface visibility at time of field investigation (in percent); nearest water source, condition on (i.e., current, projected, or past impacts); if collections were made, by whom, and when; a description of artifacts collected and the sampling strategy used; a description of all recovered artifacts, including GPS locations, and, when possible, an interpretation of all diagnostic materials as to cultural and temporal affiliation, technology, and function; a description of any previous investigations at the site; and site-specific NRHP eligibility recommendations and remarks. Include tables and figures as needed.

(12) Discuss basic information about the geomorphology of the surface or landform feature. The geomorphic discussion shall examine the possible age of the archeological site based on overall development of surface features, and estimate

potential linkage between surface processes and the stability and integrity of the selected archeological sites and other relevant issues.

(13) Geomorphic and paleontological discussions shall be included as separate chapters, included in NRHP significance evaluations, as appropriate, and integrated into the summary and conclusions.

(14) Research Summary. Use data generated by the survey to address research questions specified in the Research Design.

(15) Bias Assessment and Level of Effort. Provide detailed and accurate data pertaining to the level of effort (in number of person hours, per labor category) expended on all major activities for the duration of this project during each stage of the project including, but not limited to, the following: background research; research design and report preparation; number of person hours expended on the excavation of post hole/auger tests, walk-over survey per acre surveyed, site mapping, artifact processing, and artifact analysis and report preparation. Other pertinent logistical data to be discussed in the Final Report include effects of surface visibility, weather conditions, and other factors on the rate and/or quality of work.

(16) Study Area Findings and Recommendations. Synopses of the historical, ethnographic, archeological, geomorphological, and paleontological findings, as appropriate, and recommendations offered for individual resources with the study area.

(17) References. Use the *American Antiquity* format for every publication, work, or interview cited in the report.

4.4.2 Final Report

Digital and printed copies of the final report (number to be determined by client) and a single camera-ready copy shall be submitted within 30 days after receipt of comments on draft report. Digital copies shall be submitted as an Adobe PDF file on CD-Rs. The draft

and final report shall be single-spaced and tables, plates, figures, etc., shall be integrated into the body of the report.

4.5 SAFETY PLAN AND BASE COORDINATION

Prior to the commencement of fieldwork, GMI will provide employees involved in the project with a specific safety plan for work on Andersen AFB. A safety officer, who will be responsible for compliance with the safety plan, will be appointed on the field crew. All crew members selected for the Andersen AFB project will have prior experience working on secure military bases and will be experienced in identifying, avoiding, and reporting unexploded ordnance (UXO) in fieldwork situations. All fieldwork will be planned and coordinated closely with personnel at the 36th Civil Engineering Squadron (36 CES/CEVN) and Flight Operations (36 OSS/DSX) to ensure compatibility of fieldwork with other activities in the project vicinity.

5.0 REFERENCES CITED

Butler, William B.

- 1987 Significance and Other Frustrations in the CRM Process. *American Antiquity* 52(4):820-829.

Davis, Richard D.

- 1983 *Andersen Air Force Base Central Compound Reconnaissance Survey*. Department of Parks and Recreation, Government of Guam. Manuscript on file Guam Historic Preservation Office.

DeFant, David

- 2005 Personal communication, November 22.

Haun, Alan

- 1989 *Archaeological Reconnaissance Survey of Relocatable Over-the-Horizon Radar Site P-233, Territory of Guam, Mariana Islands, Micronesia*. Prepared for Wilson Okamoto and Associates, Inc., P.H. Rosendahl, Ph.D. Inc., Hilo, Hawaii.

International Archaeological Research Institute

- 2003 Final Integrated Cultural Resource Management Plan For Andersen Air Force Base, Guam, 2003 Update. Manuscript on file, Andersen AFB.

Kurashina, Hiro, D. Moore, O. Kataoka, R. Clayshulte, and E. Ray.

- 1987 *Archaeological Survey of Areas 1, 2, 1-A, and 2-A at Northwest Field, Andersen Air Force Base and Naval Communication Area Master Station Western Pacific, Finegayan, Guam*. Prepared for Department of the Navy, Pacific Division, Naval Engineering Command. Manuscript on file Guam Historic Preservation Office.

Tuggle, H. D.

- 1993 Small and Developed Parcel Survey Areas (Andersen Air Force Base). In James Carucci, *The Archaeology of Orote Peninsula*. Prepared for Belt Collins & Associates, Honolulu.

Yee, Sandra, D.J. Welch, and J. Allen

2004. Final Archaeological Overview Survey Report for Andersen Air Force Base, Guam. Manuscript on file Guam Historic Preservation Office.

APPENDIX 1

Major Fields In The General Guam Cultural Resources Database

Temp No
1_Common Name
1_Historic Name
1_Site Type
2_Street Number
2_Lot_Estate No
2_Municipality
2_Land Square
2_Land Section
2_GSA Code Number
2_Local Place Name
2_Site ID No
4_Owner Name
4_Street Number
4_Mailing Address
4_Municipality
4_Telephone
4_Leasee Name
4_Leasee Address
4_Owner Attitude
4_Additional Info
5_Government Agency
5_Street Number
5_Mailing Address
6_Title of Survey
6_Author/Participant
6_Date
6_Type
6_Records_Repository
6_Artifacts_Repository
8_Period
8_Specific Dates
8_Significance
8_Example
8_Susceptability
8_Potential
8_Attitude
8_Evaluation
8_Disposition
8_Suggested Themes
8_Additional Comments

8_Evaluator
8_Title
9_Legendary Materials
9_Written Historical Materials
SD_Description
SD_Significance
SD_Recommended

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Owner's Attitude:	<input type="text"/>
Additional Info:	<input type="text"/>
5 Location of Legal Description	
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Street Number:	<input type="text"/>
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6 Representation in Existing Surveys	
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Author/Participant:	<input type="text"/>
Date:	<input type="text"/>
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Integrity:	<input type="text"/>
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Specific Dates:	<input type="text"/>
Area of Significance:	<input type="text"/>

Record: 1 of 1

Reproduction of a portion of the Guam Site Form as an Access database form, used in conjunction with field components of MARK 1.0

APPENDIX E
SECTION 7 CONSULTATION,
BIOLOGICAL ASSESSMENT FOR ESTABLISHMENT AND
OPERATION OF AN INTELLIGENCE, SURVEILLANCE,
RECONNAISSANCE AND STRIKE CAPABILITY, AND BIOLOGICAL
OPINION

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SECTION 7 CONSULTATION, BIOLOGICAL ASSESSMENT FOR ESTABLISHMENT AND OPERATION OF AN INTELLIGENCE, SURVEILLANCE, RECONNAISSANCE, AND STRIKE CAPABILITY, AND BIOLOGICAL OPINION

The Air Force initiated coordination with the United States Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act (ESA) on March 22, 2005 by requesting consultation and conference with the USFWS. The USFWS's June 30, 2005 response to the May 18, 2005 notice in the Federal Register identified the endangered plant *Serianthes nelsonii* and endangered Mariana crow and threatened Mariana fruit bat as occurring on Andersen AFB. The response also noted that the Base contains habitat identified as essential to the recovery of the endangered Guam Micronesian kingfisher, endangered Guam rail, Mariana crow, and Mariana fruit bat. The response also noted concern with brown tree snake (BTS) (*Boiga irregularis*) control and interdiction. The USFWS also recommended that the Air Force include a vegetation survey of the areas that may be affected by the proposed action. The Air Force provided results of the vegetation survey to the USFWS on August 25, 2005 as an attachment to a letter that also requested informal consultation. A biological assessment (BA) was prepared and submitted to the USFWS on March 22, 2006 in support of formal consultation under the ESA. The formal consultation period began May 22, 2006. The Air Force and USFWS met to discuss the project and associated issues on August 1, 2006. The USFWS prepared a BO on October 3, 2006 in response to the BA.

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DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES

MEMORANDUM FOR U.S. FISH AND WILDLIFE SERVICE


22 Mar 05

Pacific Islands Ecoregion
300 Ala Moana Boulevard, Suite 3-122
Honolulu, HI 96813

FROM: HQ PACAF/CEV
25 E Street, Suite D-306
Hickam AFB, HI 96853-5412

SUBJECT: Notice of Consultation for Andersen Air Force Base (AFB), Guam

1. In accordance with Section 7 of the Endangered Species Act, the Air Force (AF) is pursuing consultation and conference for the proposed basing actions at Andersen AFB, Guam. As an active partner of Andersen's wildlife refuge initiative, the AF is ready for cooperative discussion and engagement with your office.
2. The AF proposes two separate basing initiatives at Andersen AFB. The first initiative entails basing of training and support units (non-aircraft related) at Northwest Field. This initiative enables co-location of three geographically separated training organizations at Guam. Secondly, the AF proposes to increase aircraft presence on the main base area of Andersen AFB. The new aircraft's mission is to establish an intelligence, surveillance, reconnaissance, strike, and refueling capability in the Pacific region.
3. If members of your staff have any questions, please call my point of contact Mr. Dana Lujan at 315-366-3049 or email: dana.lujan@andersen.af.mil.


JOYCE F. SOHOTRA, Colonel, USAF
Chief, Environmental Division
Directorate of The Civil Engineer



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850



In Reply Refer To:
PN-05-297

JUN 30 2005

Scott Whittaker
Environmental Flight Chief
Andersen Air Force Base, Unit 14007
APO AP 96543-4007

Dear Mr. Whittaker:

On May 18, 2005, the Department of Defense (DOD) published in the *Federal Register* a Notice of Intent to prepare a draft Environmental Impact Statement (EIS) for the proposed Basing of a Global Strike Task Force on Andersen Air Force Base (AAFB), Guam. The notice provides an opportunity to comment on issues to be addressed in the draft EIS. This letter has been prepared under the authority of and in accordance with provisions of the National Environmental Policy Act of 1969 [42 U.S.C. 4321 *et seq.*; 83 Stat. 852], as amended (NEPA), the Endangered Species Act of 1973 [16 U.S.C. 1531 *et seq.*; 87 Stat. 884], as amended (ESA), the Sikes Act Improvement Act of 1997 [16 U.S.C. 670 *et seq.*; 74 Stat. 1052], as amended (SAIA), and other authorities mandating U.S. Fish and Wildlife Service (Service) concern for environmental values. Based on these authorities, the Service offers the following recommendations and comments for your consideration.

We understand that the Air Force proposes to base 3 Global Hawk, 12 aerial refueling, 48 fighter and 6 bomber aircraft on AAFB. These aircraft will be rotated to AAFB from bases elsewhere in the United States. Approximately 2,400 additional military, civilian and contractor personnel will be required on AAFB to support these aircraft. The proposed action also includes facility construction and expansion projects required to support basing and operations.

Federally listed endangered species

The endangered plant *Serianthes nelsonii*, endangered Mariana crow (*Corvus kubaryi*), and threatened Mariana fruit bat (*Pteropus mariannus mariannus*) occur on AAFB. In addition, AAFB contains habitat identified as essential to the recovery of the endangered Guam Micronesian kingfisher (*Halcyon cinnamomina cinnamomina*), endangered Guam rail (*Gallirallus owstoni*), Mariana crow, and Mariana fruit bat (U.S. Fish and Wildlife Service 1990, 69 *Federal Register* 62944). Although predation by the brown treesnake (*Boiga irregularis*) is the primary cause of decline of these species, habitat loss and degradation are also threats that may impede or preclude the recovery of these species. We recommend the EIS analyze possible

TAKE PRIDE[®]
IN AMERICA

Scott Whittaker

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impacts to federally listed species and their habitat as a result of your proposed action and effects on implementation of needed recovery actions on AAFB. We also recommend you include in the EIS a vegetation survey of areas that may be affected by the proposed action. We further recommend including in the EIS an estimate of the proposed affected area per habitat type (e.g., weedy edge habitat) so the effects of alternatives can be adequately addressed.

The EIS should include alternatives that avoid and minimize impacts to primary and native dominant secondary forest. For example, we understand from the presentation at the Scoping Meeting that a site primarily composed of native dominant secondary forest, located northwest of the runway, may be included in your proposed action. Mariana fruit bats are known to use this area for foraging (D. Janeke unpublished data). We recommend that you contact Anne Brooke, U.S. Fish and Wildlife Service, to obtain the most current information on Mariana fruit bat locations and refrain from these areas in your preferred alternative. Unavoidable impacts to primary and native dominant secondary forest as well as other trust resources should be mitigated.

Brown treesnake control and interdiction

The accidental introduction of the brown treesnake on Guam in the 1940s, resulted in the extinction and extirpation of most of the native forest bird species. This invasive species has also become a significant economic, agricultural pest, and a public health concern. Because Guam is a focal point of trans-shipment of air and sea cargo to many other parts of the Pacific, there is risk of the brown treesnake arriving to new islands as a stowaway in cargo. Great concern exists that the brown treesnake may cause similar ecological and socioeconomic problems elsewhere. For example, in Hawaii, there are at least 30 endangered avian species and one endangered terrestrial mammal, the Hawaiian Hoary Bat (*Lasiurus cinereus semotis*) that may be affected if the brown treesnake established itself. This concern is reflected in the recent passage of the Brown Tree Snake Control and Eradication Act of 2004, which authorizes establishment of Federal pre-departure quarantine protocols by October 30, 2006, for cargo and other items being shipped from Guam.

As major landholders on Guam, military agencies have management responsibilities to help ensure that the brown treesnake are not exported. The Service believes that the risk of brown treesnake dispersal from Guam needs to be reduced through long-term support of snake suppression on a landscape level on Guam. In addition, adequate funding needs to be provided for brown treesnake quarantine and control efforts related to U.S. military and civilian sites where goods from the U.S. military are shipped off Guam. Furthermore, adequate, permanent space needs to be provided for brown treesnake interdiction on Guam's military bases.

With the increase in AAFB personnel and training activities, it is expected that military and civilian traffic via air and sea ports will also increase. We are concerned that existing control and containment activities for brown treesnakes at air and sea ports are not adequate for dealing with the potential significant increase in movement of cargo and personnel from Guam to other high risk destinations. We recommend you include in your EIS an analysis of the risk of brown treesnake dispersal from Guam to other Pacific Islands such as Hawaii and other Mariana Islands as a result of your proposed action. Similarly, we recommend that the EIS address the

Scott Whittaker

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ecological, economic, and human health impacts that might occur if the brown treesnake were to become established in Hawaii, other Mariana Islands, the Federated States of Micronesia, and the Republic of Palau through military transport, vehicles, personnel, and household goods associated with departing military personnel.

We recommend that you refer to the independent Review of the Brown Treesnake Problems and Control Programs, dated March 2005, as you address this issue. This report can be found on the web at [ftp://ftpext.usgs.gov/pub/cr/co/fort.collins/BTS](http://ftpext.usgs.gov/pub/cr/co/fort.collins/BTS). We also recommend that you refer to Executive Order 13112 section 2(3) which instructs Federal agencies to take all feasible and prudent measures to minimize risk of harm from invasive species.

Integrated Natural Resources Management Plan (INRMP)

In compliance with the SAIA, military installations must prepare INRMPs that provide for conservation and rehabilitation of natural resources, sustainable multipurpose uses of the resources, and public access for use of natural resources, subject to safety requirements and military security. The Air Force completed a final INRMP for AAFB in February 2002 which was updated in December 2003. This updated version includes additional management requirements to supplement existing activities to better meet the "special management considerations" intent of 3(5)(A) of the ESA, which helped support the decision to exclude AAFB from critical habitat for the Mariana fruit bat, Mariana crow, and Guam Micronesian Kingfisher.

We recognize AAFB's ongoing commitment to the preservation of listed species and their habitat. However, we are concerned that implementation of the proposed action may preclude the Air Force from meeting the management goals presented in the INRMP. We recommend that you include in your EIS an analysis of how implementation of the proposed action will be consistent with present and future resource management program projects at AAFB that were identified in the INRMP.

In particular, we recommend continued support of the construction of a snake barrier around the Munition Storage Area and management of this area for brown treesnakes and ungulates, as discussed in the INRMP. We also recommend continued support for *S. nelsonii* restoration efforts, which include outplantings and ungulate control.

It is our understanding that the Area 50 project may be moved to another site. Area 50 is a demonstration site for localized snake and ungulate eradication and natural resource restoration. Significant amounts of funding, effort, and planning have been expended by several Territorial and Federal agencies to implement this project. If Area 50 is to be moved, we recommend you choose a site that contains a significant portion of primary forest and that you sufficiently fund and support the original intended project, as discussed in your INRMP.

In fiscal year 2004, the SAIA was amended to add language specific to invasive species on Guam: Section 101 states that the Secretary of Defense shall "incorporate in integrated natural resources management plans for military installations in Guam the management, control, and eradication of invasive species." For example, on Guam, non-native Philippine deer (*Cervus*

Scott Whittaker

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mariannus syn. *C. philippinus*) and feral pigs (*Sus scrofa*) suppress the regeneration of native trees and encourage the spread of invasive weed species. With the increase in activity at AAFB, we are concerned about the status of the public hunting program and ungulate suppression efforts, as discussed in your INRMP. Control of non-native Philippine deer and feral pig populations helps reduce damage to the forest habitat caused by these ungulates. We recommend your EIS analyze how implementation of the proposed action will be consistent with present and future resource management program projects that control for invasive species (e.g., ungulates, brown treesnakes, etc.) at AAFB that were identified in the INRMP.

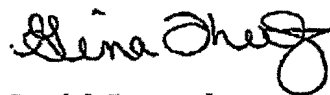
Cumulative impacts

We recommend you include an analysis of the cumulative effects of past, present, and future Air Force and Navy projects on AAFB in your EIS.

In conclusion, as required under NEPA, we recommend that the EIS analyze various alternatives to implement the proposed action to Basing of a Global Strike Task Force, AAFB, Guam. We also recommend that the EIS include an analysis of environmental impacts for each alternative, including any proposed measures to avoid, minimize or offset these impacts and that you select as your proposed action the alternative that is least damaging to fish and wildlife resources. As a reminder, pursuant to Section 7 of the Endangered Species Act, if you determine that your proposed action may affect listed species or critical habitat, you must consult with us.

We appreciate the opportunity to comment on the Notice of Intent for the proposed Basing of a Global Strike Task Force, AAFB, Guam, and look forward to reviewing the draft EIS. If you have any questions regarding these comments, please contact Leilani Takano, Fish and Wildlife Biologist, by phone 808/792-9400.

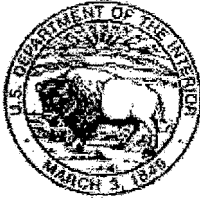
Sincerely,



607 Patrick Leonard
Field Supervisor

cc:

DAWR, Guam
DOA, Hawaii
EPA, Guam
PACAF, Hawaii
USDA WS, Guam



United States Department of the Interior

FISH AND WILDLIFE SERVICE

GUAM NATIONAL WILDLIFE REFUGE

PO BOX 8134, MOU-3

DEDEDO, GUAM 96929

Telephone (671) 355-5096

Fax Number (671) 355-5098



June 30, 2005

Mr. Scott Whittaker
Environmental Flight Chief
36 CES/CEV, Unit 14007
APO, AP 96543-4007

Dear Mr. Whittaker:

Thank you for this opportunity to comment on the proposal to prepare a Draft Environmental Impact Statement (DEIS) for the proposed Global Strike Task Force (GSTF) basing on Andersen Air Force Base, Guam.

The proposal will impact two forested areas of the Overlay Refuge of Guam National Wildlife Refuge (NWR) located on Andersen Air Force Base. The expansion of base housing into the limestone forest is a great concern as is the proposal for possible activity in the secondary-growth forest area located northwest of the main runways and between the beaches access road and the top of the cliff.

We believe that alternatives exist to expanding the housing into the limestone forest. The new housing area could easily be constructed on the existing golf course. Six or seven golf courses are already present on Guam and the Andersen AFB golf course does not appear to be essential to the Air Force mission. Ample space exists to construct housing within the footprint of the existing Andersen AFB golf course. The course could perhaps be reduced to a nine hole course and still provide adequate room for the proposed new housing.

The Air Force also owns land at Potts Junction which is adjacent to the Base and to the Starts Golf Resort. This parcel could also be used to construct a housing area with easy access to the Base.

We would like the Air Force to consider housing designs that include multi-story units so that more housing can be built in a more compact area to better utilize existing space.

As for the secondary-growth forest northwest of the runways, the proposal did not provide sufficient information to provide comments on proposed activities in this area. The DEIS must provide specific information on the proposed activity within this area.

This proposal should not be considered in isolation from other activities that may be considered for Andersen AFB, including proposed activities on Northwest Field and the Munitions Storage

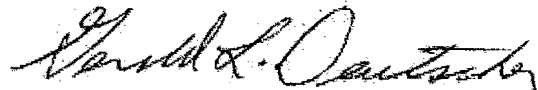
Area. The DEIS must consider the cumulative impacts of this proposed action and future actions which may negatively impact the forest habitat and species dependent upon it.

The DEIS should state how much primary and secondary growth forest may be lost due to clearing and construction. This is needed to assess the amount of habitat that will be lost. We recommend that a vegetation survey of the forest habitat within the proposed project area be conducted to determine the impacts.

The Air Force should conduct a cultural resource survey of all proposed construction sites to determine if any culturally significant sites will be impacted by the proposed activity.

We appreciate the opportunity to provide comments on behalf of Guam National Wildlife Refuge. As a reminder, our Pacific Islands Fish and Wildlife Office in Honolulu, Hawaii is the contact point for any issues concerning Endangered Species and Section 7 consultation. Thank you for keeping us informed on this proposed activity; we look forward to working cooperatively with you on into the future.

Sincerely,

A handwritten signature in dark ink, appearing to read "Gerald L. Deutscher", written in a cursive style.

Gerald L. Deutscher
Project Leader



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 36TH AIR EXPEDITIONARY WING (PACAF)
UNIT 14007, APO AP 96543-4007

25 August 2005

Lt Col Marvin W. Smith, Jr.
36th Civil Engineer Squadron
Unit 14007
APO AP 96543-4007

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AUG 30 2005

U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWO
HONOLULU, HI 96850

Mr. Patrick Leonard
Field Supervisor
United States Fish and Wildlife Service
Pacific Island Office
300 Ala Moana Blvd., Suite 3-122
Honolulu, HI 96813

Dear Mr. Leonard,

In reference to our letter dated 22 March 2005, titled "Notice of Consultation for Andersen AFB, Guam (Attachment 1)", we wish to provide additional information in support of our ongoing Section 7 consultation on the proposed construction of facilities and utilities supporting the basing of training and associated personnel at Northwest Field, Andersen AFB. To assist you, we have included an area map showing the location of the proposed facilities and utility lines for construction (Attachment2).

In accordance with the National Environmental Policy Act (NEPA), the Air Force has contracted Parsons Corporation to prepare an Environmental Assessment. As part of this effort, vegetation surveys were conducted in June 2005. The survey is incorporated into our Draft Environmental Assessment, and included as Attachment 3. In addition, we wish to address in a separate informal consultation, the proposed actions to base and rotate additional aircraft on the Main Base portion of Andersen AFB. These action and impacts will be addressed in the "Global Strike Task Force" EIS currently under development.

We would like to continue with our current informal consultation, and await your recommendation to either proceed with the informal consultation or a formal process. If you or your staff has any questions, please contact either Mr. Dana Lujan at 671-366-3049 or by email: dana.lujan@andersen.af.mil or Mr. Jonathan Wald at 671-366-2549 or email: jonathan.wald@andersen.af.mil.

MARVIN W. SMITH, JR., LtCol, USAF
Commander, 36th Civil Engineer Squadron



DEPARTMENT OF THE AIR FORCE
36th CIVIL ENGINEER SQUADRON (PACAF)
UNIT 14007, APO AP 96543-4007

Lt Col Marvin W. Smith, Jr.
36th Civil Engineer Squadron
Unit 14007
APO AP 96543-4007

22 March 2006

Mr. Patrick Leonard
Field Supervisor, U.S. Fish and Wildlife Service
Pacific Island Office
300 Ala Moana Blvd, Room 3-122, Box 50088
Honolulu, HI 96850

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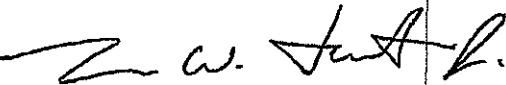
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWO
HONOLULU, HI 96850

Dear Mr. Leonard

Thank you for your technical advice in support of the section 7, formal consultation as it relates to the proposed ISR/Strike Beddown at Andersen AFB. We have considered your comments and updated the biological assessment (BA) to reflect your input. We would now like to officially enter formal Section 7 consultation.

We realize that our proposed actions, as discussed and analyzed in the BA, may affect listed species including the Mariana crow, Mariana fruit bat, and the Guam Micronesian kingfisher. We have included as part of the proposed action numerous conservation measures that will significantly minimize any impacts to most of the listed species to the point of no adverse affect. The accompanying BA contains all of the required information including descriptions of the proposed action, area affected, listed species and habitat affected, and pertinent analysis relative to the proposed action, current status of the species and the recovery efforts for those species.

In summary, we have determined that the proposed action may affect, but is not likely to adversely affect any listed species found on Andersen AFB with the exception of the Mariana fruit bat. We request your concurrence of our determination and look forward to working with your office throughout the consultation period. We value your support in our responsibility to carrying out the Air Force mission in balance with species protection. If you have any questions please contact Mr. Jonathan Wald at (671) 366-2549 or by email at jonathan.wald@andersen.af.mil.


MARVIN W. SMITH, JR., Lt Col, USAF
Commander

Attachment:
Biological Assessment



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 36TH WING (PACAF)
UNIT 14007, APO AP 96543-4007

19 May 2006

Commanding Officer
36th Civil Engineer Squadron
Unit 14007
APO AP 96543-4007

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MAY 22 2006

Mr. Patrick Leonard
Field Supervisor, U.S. Fish and Wildlife Service
Pacific Island Office
300 Ala Moana Blvd, Room 3-122, Box 50088
Honolulu, HI 96850

U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWO
HONOLULU, HI 96850

Re: 1-2-2006-F-266

Dear Mr. Leonard

Thank you for your comments and request for additional requirements to complete the initiation package of formal Section 7 consultation pursuant to the Endangered Species Act of 1973 for the proposed ISR/Strike Beddown project on Andersen Air Force Base, Guam. The information requested for the proposed action is addressed in the accompanying Supplement to the Biological Assessment: (1) noise analyses affecting the Mariana fruit bats and Mariana crows in the Munitions Storage Area and Northwest Field, noise levels and contours for maximum sound level of multiple aircraft formation, and (2) aircraft accident potential analysis. There are no cumulative effects of any proposed Government of Guam or private actions occurring within the action area at this time; this is addressed in the Draft Environmental Impact Statement that is currently in public review. We understand the new information provided should complete the initiation package as outlined in the regulation governing interagency consultations. The Air Force resubmits our request to initiate formal Section 7 consultation for this project.

Sincerely

MARVIN W. SMITH, JR., Lt Col, USAF
Commander, 36th Civil Engineer Squadron

Attachment:
Supplemental to Biological Assessment



DEPARTMENT OF THE AIR FORCE
36th CIVIL ENGINEER SQUADRON (PACAF)
UNIT 14007, APO AP 96543-4007

April 26, 2006


MEMORANDUM FOR SEE DISTRIBUTION

FROM: 36th Civil Engineer Squadron
Environmental Flight
Andersen Air Force Base
APO. AP 96543-4007

SUBJECT: Draft Environmental Impact Statement, Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike (ISR/Strike) Capability at Andersen Air Force Base, Guam

1. The Air Force has prepared a Draft Environmental Impact Statement (EIS) for the establishment and operation of the ISR/Strike capability that could add as many as 3,000 military, civilian, and contractor personnel and dependents at Andersen AFB. Facility construction, addition, and alteration projects would be required to support the ISR/Strike initiative. Construction would begin in 2007 and would be completed by 2016, with recurring operations continuing thereafter. The EIS provides details of the action, explains the purpose and need for the action, and assesses the potential impacts of the Proposed Action and No Action Alternative.
2. **Privacy Advisory:** Your comments on this draft EIS are requested. Letters or other written or oral comments provided may be published in the final EIS. As required by law, comments will be addressed in the final EIS and made available to the public. Any personal information provided will be kept confidential. Private addresses will be compiled to develop a mailing list for those requesting copies of the final EIS. However, only names of the individuals making comments and specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the final EIS.
3. Written comments must be postmarked by June 19, 2006 to be considered in the final EIS. Responses should come directly to: 36 CES/CEV, Unit 14007, APO, AP 96543-4007.
4. Questions can be directed to Mr. Jonathan Wald, 36 CES/CEV, (671) 366-2549.

Sincerely,


SCOTT WHITTAKER, GS-13
Chief, Environmental Flight

Distribution List
Draft Environmental Impact Statement, Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability at Andersen Air Force Base, Guam

Agencies	Individuals
Dr. C. Lynn Raulerson, Tropical Ecologist and Botanist University of Guam 303 University Station University Drive Mangilao, Guam 96929	The Honorable Adolpho B. Palacios, Sr. Guam Senator P.O. Box 24433 Barrigada Guam 96921
Lynda B. Aguon, Guam Historic Preservation Officer Department of Parks and Recreation Guam Historic Resources Division 490 Chalan Palasyo Agana Heights, Guam 96910	Mr. Mike Cruz Alberto A.C. Lamorena, Acting Administrator Guam Economic Development and Commerce Authority 590 S. Marine Drive Tamuning, Guam 96913
Ms. Evangeline Lujan Bureau of Statistics and Plans Guam Coastal Management Program P.O. Box 1950 Hagatna, Guam 96932	Mr. David Lane Henkin, Staff Attorney Earthjustice 223 S. King Street Suite 400 Honolulu, HI 96813-4501
Paul C. Bassler, Director Department of Agriculture Division of Aquatic and Wildlife Resources 142 Dairy Road Mangilao, Guam 96913	Mr. Dylan Kesler 4845 S.E. 3rd Street Corvallis, OR 97333
Mr. Chris Bandy, Project Leader U.S. Fish and Wildlife Service Guam National Wildlife Refuge P.O. Box 8134, MOU-3 Dededo, Guam 96929	Dr. Justine B. de Cruz 5 Osgood Avenue New Britain, CT 06053
Mr. Gerald S.A. Perez, Administrator Guam Economic Development Authority ITC Building, Suite 511 590 S. Marine Drive Tamuning, Guam 96913	Mr. David Fischer American Bird Conservancy 1731 Connecticut Avenue, NW, 3rd Floor Washington, DC 20009
Mr. Celestino "Tino" F. Aguon Department of Agriculture Division of Aquatic and Wildlife Resources 162 Dairy Road Mangilao, Guam 96923	Mr. Jeffrey R. Walters, Bailey Professor of Biology Virginia Polytechnic Institute and State University Department of Biology College of Arts and Sciences Blacksburg, VA 24061-0406
Mr. Patrick Leonard, Field Supervisor U.S. Fish and Wildlife Service Pacific Islands Fish and Wildlife 300 Ala Moana Blvd., Room 3-122, Box 50088 Honolulu, Hawaii 96850	Ms. Gretchen R. Grimm, President Marianas Audubon Society P.O. Box 4425 Hagatna, Guam 96932
Commonwealth of the Northern Mariana Islands Department of Lands and Natural Resources Division of Fish and Wildlife P.O. Box 10007 Saipan, MP 96950	Mr. L. Carl Peterson, CFP Money Resources, Inc. 415 Chalan San Antonio #210 Tamuning, Guam 96913
Guam Waterworks Authority P.O. Box 3010 Hagatna, GU 96932	Ms. Marjorie Ziegler Conservation Council for Hawaii P.O. Box 2923 Honolulu, HI 96802

Agencies	Individuals
<p>Guam Department of Public Works 542 North Marine Corps Drive, Tamuning, GU 96913</p>	<p>Nieves Flores Memorial Library 254 Martyr St. Hagatna, Guam 96910</p>
<p>Guam Power Authority P.O.2977, Hagatna, GU 96932</p>	<p>Ms. Sandra Lee Kunimoto, Chairperson, Board of Agriculture State of Hawaii Department of Agriculture 1428 S. King Street Honolulu, HI 96814-2512</p>
<p>Mr. Richard Seman, Secretary Commonwealth of the Northern Mariana Islands Department of Lands and Natural Resources Lower Base P.O. Box 10007 Saipan, Mariana Islands 96950</p>	<p>Mr. James Pigg 4851 Quail Run Las Cruces, NM 88011</p>
<p>Mr. Randy Sablan, Acting Administrator Guam EPA P.O. Box 22439 GMF Barrigada, Guam 96921</p>	
<p>Ms. Sandra Lee Kunimoto, Chairperson, Board of Agriculture State of Hawaii Department of Agriculture 1425 South King Street Honolulu, Hawaii 96814-2512</p>	
<p>Mr. Mark Kaminski/ Jeffrey Yamamoto COMPACFLT 250 Makalapa Dr, Pearl Harbor, HI 96860-3131</p>	
<p>Mr. Donald R. Schregardus, Deputy Assistant Secretary Department of the Navy Office of the Assistant Secretary Installations and Environment 1000 Navy Pentagon Washington, D.C. 20350-1000</p>	
<p>Mr. Anthony Hoover OMNAVREG MARIANAS No. 42 B-105 Upper Level NAVFAC Marianas Complex Naval Base Santa Rita, Guam 96915</p>	
<p>Karen Vitulano US EPA - Region IX Federal Activities Office Cross Media Division 75 Hawthorne Street San Francisco, CA 94105</p>	

**BIOLOGICAL ASSESSMENT
ESTABLISHMENT AND OPERATION OF AN INTELLIGENCE,
SURVEILLANCE, AND RECONNAISSANCE, AND STRIKE
CAPABILITY**

ANDERSEN AIR FORCE BASE, GUAM



**Department of the Air Force
Pacific Air Forces
Hickam Air Force Base, Hawaii**

March 2006

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ACRONYMS AND ABBREVIATIONS

36 OSS	36th Operations Support Squadron
AFB	Air Force Base
AGL	above ground level
ASA	aircraft staging area
BA	biological assessment
the Base	Andersen AFB, Guam
BTS	brown tree snake
DAWR	GovGuam, Division of Aquatic and Wildlife Resources
dB	decibel
DBH	diameter at breast height
DNL	day-night average sound level
DoD	Department of Defense
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FY	fiscal year
GNWR	Guam National Wildlife Refuge
GovGuam	Government of Guam
GPS	global positioning system
INRMP	integrated natural resources management plan
L_{\max}	A-weighted sound level
MSA	munitions storage area
HQ PACAF	Headquarters, Pacific Air Forces
SEL	sound exposure level
T&E	threatened and endangered
UAV	unmanned aerial vehicle
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
ISR/Strike	Intelligence, Surveillance, and Reconnaissance and Strike

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CHAPTER 1 INTRODUCTION

The purpose of this Biological Assessment (BA) is to review natural resources affected by the proposed establishment and operation of an Intelligence, Surveillance, and Reconnaissance and Strike capability (ISR/Strike) at Andersen Air Force Base (AFB, the Base), Guam. All ISR/Strike construction and recurring operations would occur on the main portion of Andersen AFB (Andersen main).

All but two of the construction projects associated with the ISR/Strike would occur on the main part of the Base, which has been extensively disturbed by previous activities and contains no native habitat. The Aircraft Staging Area (ASA) project would be constructed in a forested area that contains suitable habitat for federally and locally listed threatened and endangered (T&E) species. The Commercial Gate would be constructed in a lesser forested area west of the airfield.

The ASA project would be constructed in an area adjacent to the northwest corner of the airfield. The proposed ASA is a complex of aircraft parking aprons and hangars, taxiways, and squadron operations and maintenance facilities.

The Commercial Gate project would consist of three elements: an Entry Gate, a Truck Inspection Facility, and an existing road between the Entry Gate and the Truck Inspection Facility that would be repaved. Although the Commercial Gate is a single project in the Air Force programming process, the three elements are considered individually in this BA.

This BA focuses on the areas in which the ASA and the Commercial Gate would be constructed, aircraft operations, and movement of aircraft, people, and materials to and from Andersen AFB. This review contains sufficient detail to determine the extent to which establishment and operation of the ISR/Strike would affect any of the nine federally listed or Guam listed T&E species or one locally rare species that potentially occur in the area where the ASA and the Commercial Gate would be constructed. This BA is in accordance with legal requirements set forth under the Federal Endangered Species Act (ESA) (16 United States Code [USC] 1531 *et seq.*).

Although there are additional federally and locally listed T&E species, those species and suitable habitat are not present in the areas proposed for the ASA or Commercial Gate. The species listed in Table 1-1 are considered by the U.S. Fish & Wildlife Service (USFWS) and conservation officers at Andersen AFB to be the most critically important at this time for these areas. Plant species are named in the text by the scientific name followed by the Chamorro common name. Chamorro common names are taken from Lee (1985); Raulerson and Rinehart (1991); and Moore and McMakin (2005). Plant species are named by the abbreviated scientific name after the first reference, except for those species with the same initial letter of the genus and the same specific name. The latter are named by the entire scientific name throughout. Animal species are named by the English common name, followed by the scientific name. After first use, the English common name is used for animals.

Appendix A to this BA includes a request for Section 7 consultation from Headquarters, Pacific Air Forces (HQ PACAF) (dated March 22, 2005), and species and recommendations addressed by the USFWS in a letter to Andersen AFB from Mr. Patrick Leonard, Field

Supervisor dated September 30, 2005, and other species considered important at Andersen AFB from email correspondence with Mr. Fred Amidon, USFWS, Hawaii.

Appendix B to this BA includes a letter from the Undersecretary of Defense, the Honorable Kenneth J. Krieg, dated November 7, 2005, to Senators Daniel K. Inouye and Daniel K. Akaka, and Congressmen Neil Abercrombie and Ed Case concerning Brown tree snake (BTS) interdiction and control. This BA addresses the species listed in Table 1-1.

Table 1-1 Species of Concern

	Scientific Name	Common Name	Federal Listing	Guam Listing
Plants	<i>Heritiera longipetiolata</i>	Ufa halomtano	--	Endangered
	<i>Serianthes nelsonii</i>	Hayun lagu	Endangered	Endangered
	<i>Tabernaemontana rotensis</i>	--	--	Locally rare
Mammals	<i>Pteropus mariannus mariannus</i>	Mariana fruit bat	Threatened	Endangered
Birds	<i>Corvus kubaryi</i>	Mariana crow	Endangered	Endangered
	<i>Halcyon cinnamomina cinnamomina</i>	Micronesian kingfisher	Endangered	Endangered
	<i>Rallus owstoni</i>	Guam rail	Endangered	Endangered
Snails	<i>Partula radiolata</i>	Pacific tree snail	Candidate for Listing	Threatened
	<i>Partula gibba</i>	Mariana Islands tree snail	Candidate for Listing	Endangered
	<i>Samoana fragilis</i>	Mariana Islands fragile tree snail	Candidate for Listing	Endangered
Insects	<i>Hypolychnus octicula</i> var. <i>mariannensis</i>	Mariana eight-spot butterfly	Candidate for Listing	Endangered

In addition to T&E species, this BA also considers three invasive species that may be displaced from their habitats due to construction or logistical activities associated with the ISR/Strike project. These species have had substantial impacts on vegetation, native avian and mammal species, and may affect recovery of suitable habitat for T&E species. The invasive species considered in this BA are listed in Table 1-2.

Table 1-2 Invasive Species

Common Name	Scientific Name
Brown tree snake	<i>Boiga irregularis</i>
Philippine deer	<i>Cervus mariannus</i>
feral pigs	<i>Sus scrofa</i>

The BA is organized into nine chapters:

- Chapter 1 **INTRODUCTION.** Identifies the purpose of the BA and describes installation history, mission, and ASA location.
 - Chapter 2 **PROPOSED ACTION.** Identifies the construction and operations for the ISR/Strike project.
 - Chapter 3 **ECOLOGICAL SETTING.** Provides a review of the historical setting and existing conditions of Andersen main.
 - Chapter 4 **INTERRELATED STUDIES.** Presents a summary of other environmental studies conducted for Andersen AFB related to the presence and absence of T&E species.
 - Chapter 5 **METHODS.** Describes methods used for determining the current conditions and presence and absence of T&E species and locally important species included in this BA.
 - Chapter 6 **RESULTS.** Presents the effects determination of the proposed action.
 - Chapter 7 **CONSERVATION MEASURES.** Summarizes the conservation measures incorporated into the proposed action to support recovery of the listed species on Andersen main.
 - Chapter 8 **REFERENCES.** Lists the sources used in this report.
 - Chapter 9 **INDEX.** Presents a list of key words, phrases, organizations, and other important terms used in this BA, as well as the page on which the item appears.
- Appendix A - Contains correspondence related to the BA and Section 7 consultation.
- Appendix B - Contains correspondence related to the issues of the Brown tree snake on Guam.
- Appendix C - Contains the Andersen AFB BTS Inspection and Interdiction Plan.
- Appendix D - Contains aircraft noise information.

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CHAPTER 2 PROPOSED ACTION

2.1 DESCRIPTION OF THE PROPOSED ACTION

Establishment of the ISR/Strike capability would be established in four phases at Andersen AFB, and all proposed construction and aircraft operation activities would occur on Andersen main. The first phase would begin in fiscal year (FY) 2007 and the last phase would be completed in FY16. The phases are:

FY07-08, initial operating capability;

FY09-11, Phase 1;

FY12-14, Phase 2; and

FY15-16, Phase 3.

Establishment of the ISR/Strike capability could be accomplished through one of two alternatives. Alternative A would permanently base 12 KC-135 aerial refueling aircraft and four RQ-4 unmanned aerial vehicle (UAV) aircraft and personnel at Andersen AFB, and rotate 48 F-22 or F-15E fighter and six B-1, B-2, or B-52 bomber aircraft and personnel from Air Force bases in the 50 states to Andersen AFB. Alternative B would rotate 48 F-22 or F-15E fighters, 12 KC-135, and six B-1, B-2, or B-52 bomber aircraft and associated personnel from Air Force bases in the 50 states to Andersen AFB. More personnel would be based and more facilities would be constructed under Alternative A than under Alternative B, and Alternative A would have more potential environmental effects. Under Alternative B, the UAV aircraft and personnel would be permanently based at Andersen AFB. Therefore, the construction and recurring operations associated with Alternative A are considered in this BA.

Basing includes permanently placing aircraft and personnel at a selected location. Personnel authorizations are established at that location and facilities are provided to support the personnel and aircraft. Dependents may be authorized to accompany based personnel.

Under the rotational concept, aircraft and personnel temporarily relocate from the installation at which they are permanently based to the rotational location. The aircraft and personnel are at the rotational location on a temporary basis until they are replaced by the next group of rotational aircraft and personnel. The rotational location is not authorized support facilities at the same level as those for permanently based aircraft, nor does it receive an increase in personnel authorizations. Dependents are not authorized to accompany rotational personnel.

Base population could increase by about 3,000 persons when considering the additional military personnel and dependents. About 650 military personnel would be permanently assigned to Andersen AFB for 2 to 3 years at a time. It is estimated that approximately 1,100 dependents would accompany the permanently assigned personnel. There would be approximately 1,250 personnel at the Base in a rotational status.

ISR/Strike aircraft operations would occur during and after full establishment. While the number of bomber and UAV aircraft would be constant at six and four aircraft, respectively, throughout the implementation, the number of fighter and tanker aircraft will increase as

implementation progresses. The number of bomber and UAV aircraft operations throughout and after full implementation will remain at the levels associated with the initial operating capability. However, the number of fighter and tanker aircraft operations will increase as the numbers of aircraft increase throughout the implementation.

2.1.1 Personnel, Household Goods, Equipment, and Aircraft Movement

It is expected that the 650 permanently assigned personnel would be at Andersen AFB for 2 to 3 years at a time. Based on a 3-year assignment duration, about 220 of the permanently assigned personnel and associated dependents would depart Andersen AFB each year. These individuals would travel to and from Guam and Andersen AFB by commercial air carrier flights that use Guam International Airport. The majority of household goods belonging to the permanently assigned personnel would be shipped as cargo in ships. Thus, there could be an additional approximate 220 household goods shipments each year requiring BTS inspection. Small portions of household goods for each assigned person and dependents would be shipped as air freight on routine cargo movement flights from Andersen AFB.

Based on three rotations per year and 48 fighter aircraft, six bomber aircraft, and 1,250 personnel per rotation, it is estimated that 324 flights and 3,750 personnel would rotate to/from Andersen AFB annually. One hundred sixty-two of the rotational fighter and bomber flights would be departures from Andersen AFB. Rotational personnel would travel to and from Andersen AFB by contract commercial aircraft. Approximately 32 flights would be required to transport these personnel to and from the Base, 16 of which would be departures from Andersen AFB. There would be a combined 194 aircraft departures related to aircraft rotations, or an average of less than one aircraft each day, requiring BTS inspection.

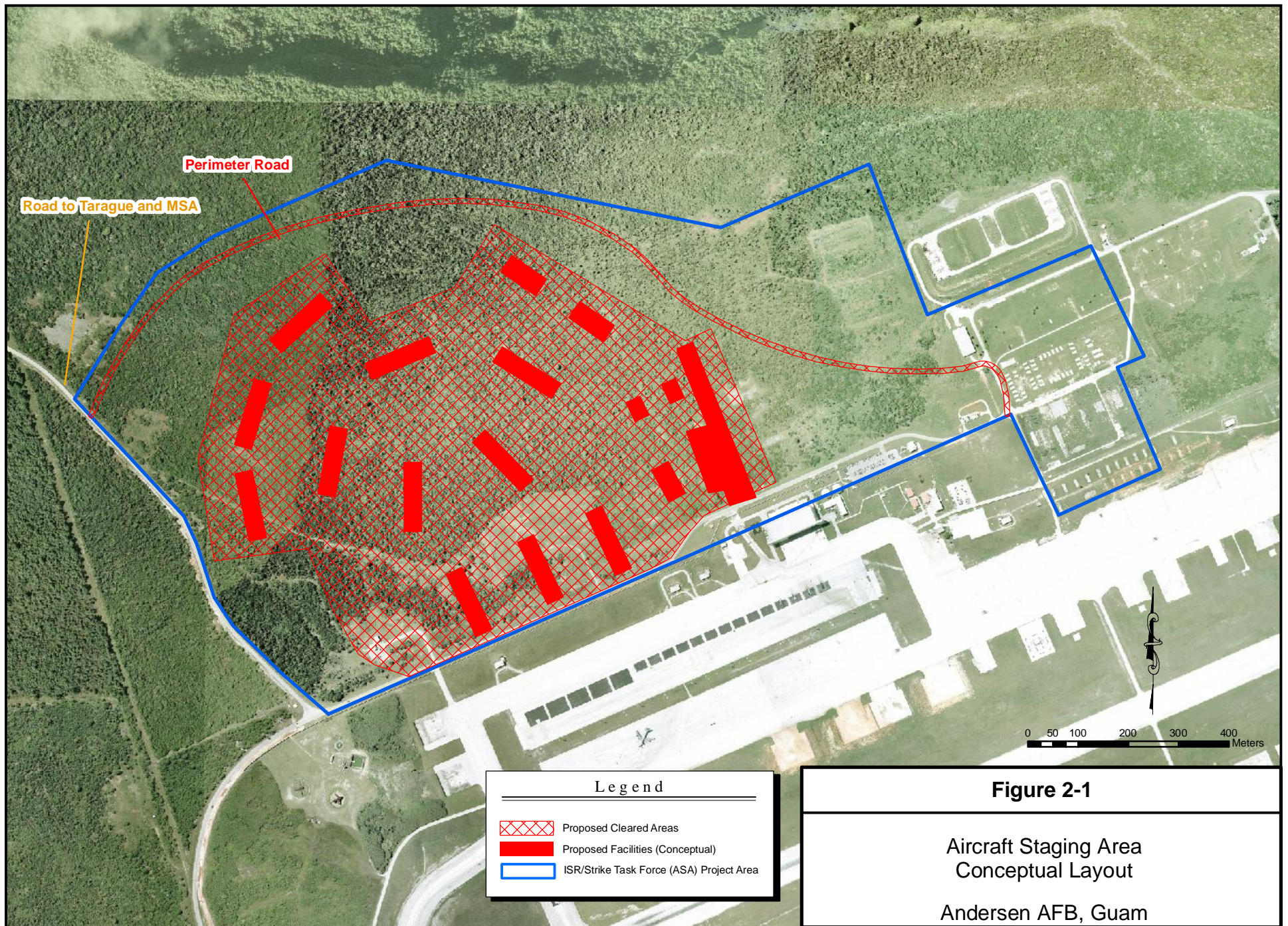
Equipment and other items necessary to support rotational aircraft operations would be retained at the Base from rotation to rotation, thereby minimizing the need for flights to move equipment to and from Andersen AFB in conjunction with the rotational aircraft. Rotational personnel would bring only personal effects which could be accommodated as baggage on the aircraft on which the individuals travel.

2.1.2 Facilities and Construction

Numerous facilities would be constructed to support the ISR/Strike capability. Most of these will occur on Andersen main in developed areas with urban landscape, and are not considered in this BA. Three facilities will be constructed in forested areas and are described below. The effects of construction and operation of these facilities on T&E species are considered in this BA.

Aircraft Staging Area Facilities Construction

Approximately 23 different facilities, taxiways, and aircraft parking aprons would be constructed for the ASA. Figure 2-1 shows the conceptual layout and relative sizes of the proposed ASA complex. The ASA is where the F-22 and F-15E aircraft would be parked and maintained. Clearance areas associated with facilities and road construction total 66.4 hectares. Table 2-1 lists the forest habitat that would be cleared for facility construction.



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Table 2-1 Proposed Forest Habitat Clearing

Project Area Name	Cleared Area	Project Area
ASA (including perimeter road)	66.4	136.7
Entry Gate	3.5	3.5
Commercial Gate Road	0.0	0.0
Truck Inspection Facility	4.0	4.0
Total	73.9	144.2

Commercial Gate

The Commercial Gate project consists of three elements: constructing an Entry Gate; constructing a Truck Inspection Facility between the Entry Gate and the western end of the airfield; and repaving an existing road between the Entry Gate and the Truck Inspection Facility sites (see Figure 2-2). All commercial vehicles would enter the Commercial Gate but would exit the Base via the Main Gate. It is estimated about 200 commercial vehicles would enter the Base through the Commercial Gate, which likely would operate from 6:00 a.m. to as late as 9:00 p.m.

Entry Gate

An Entry Gate will be constructed along Route 9 to allow for commercial and contractor vehicles to enter the Base on the west side of Andersen main Base. This facility will require a paved entry with gate, security fence, and small facility for security personnel. This facility is shown in Figure 2-2. Clearance areas associated with the Entry Gate amount to 3.5 hectares.

Truck Inspection Facility

A Truck Inspection Facility will be constructed east of the Entry Gate for the purpose of inspecting vehicles and material delivered to the Base. The Truck Inspection Facility is shown on Figure 2-2. Clearance areas associated with the Truck Inspection Facility amount to 4.0 hectares.

Commercial Gate Road

The existing road between the sites for the Entry Gate and the Truck Inspection Facility would be repaved to a width of 7.3 meters with 1-meter shoulders on each side, for a total width of 9.3 meters. Because the existing road corridor can accommodate proposed road modifications, vegetation clearance within the existing road corridor would be minimal and limited to removal of herbaceous or shrubby vegetation. Street lights would be installed along the road between the Entry Gate and the Truck Inspection Facility. The street lights would be illuminated only when the Commercial Gate is in operation.

2.1.3 Aircraft Operations

As indicated in Subchapter 2.1, the ISR/Strike capability would be established in four phases. Table 2-2 lists the number of aircraft involved in each phase of the implementation.

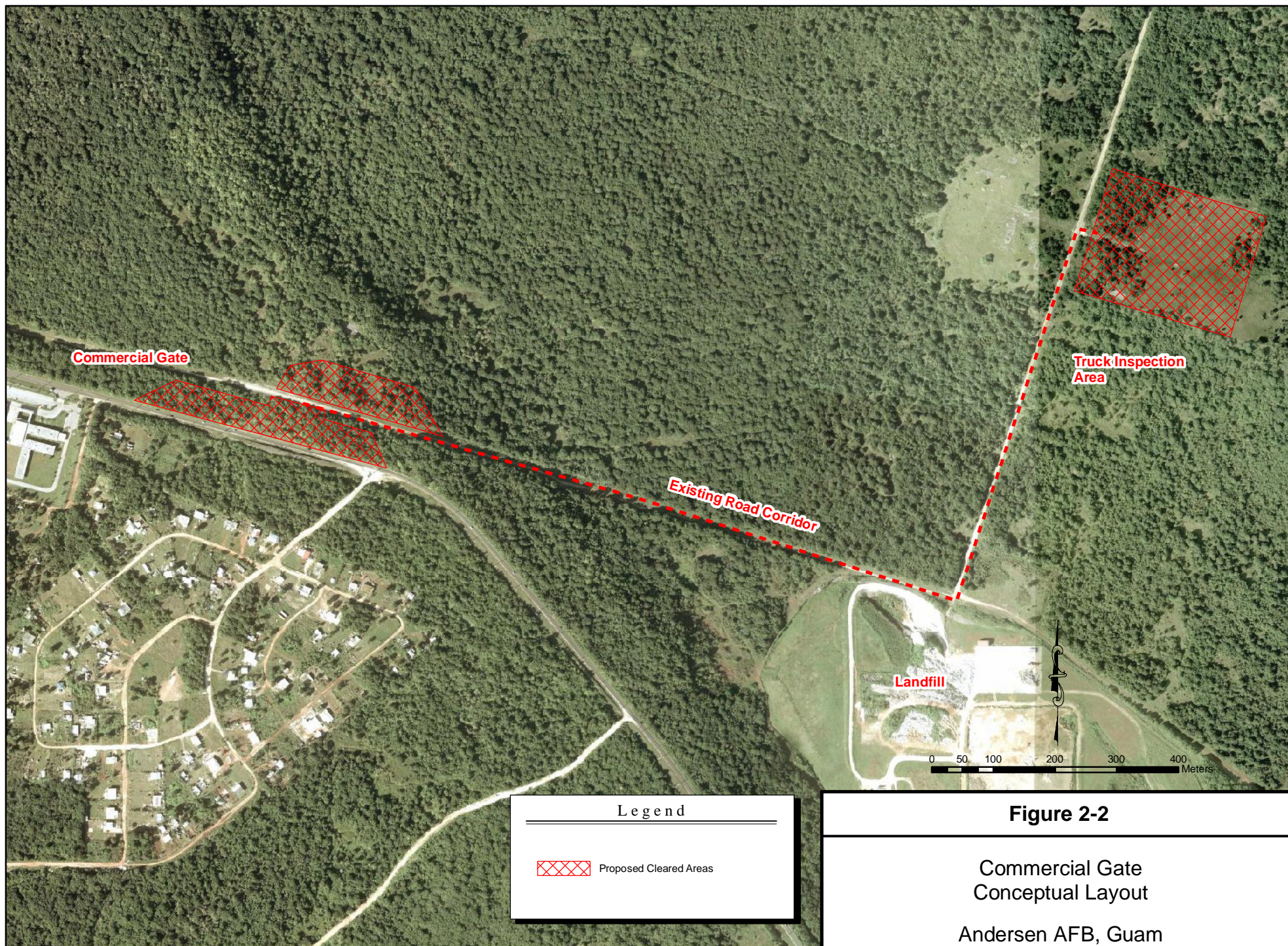
Table 2-2 Number of ISR/Strike Aircraft Associated with Alternative A

	Initial Operating Capability	Phase 1	Phase 2	Phase 3
Based				
Tanker	6	12	12	12
UAV	4	4	4	4
Rotational				
Fighter	12	24	24	48
Bomber	6	6	6	6
Total	28	46	46	70

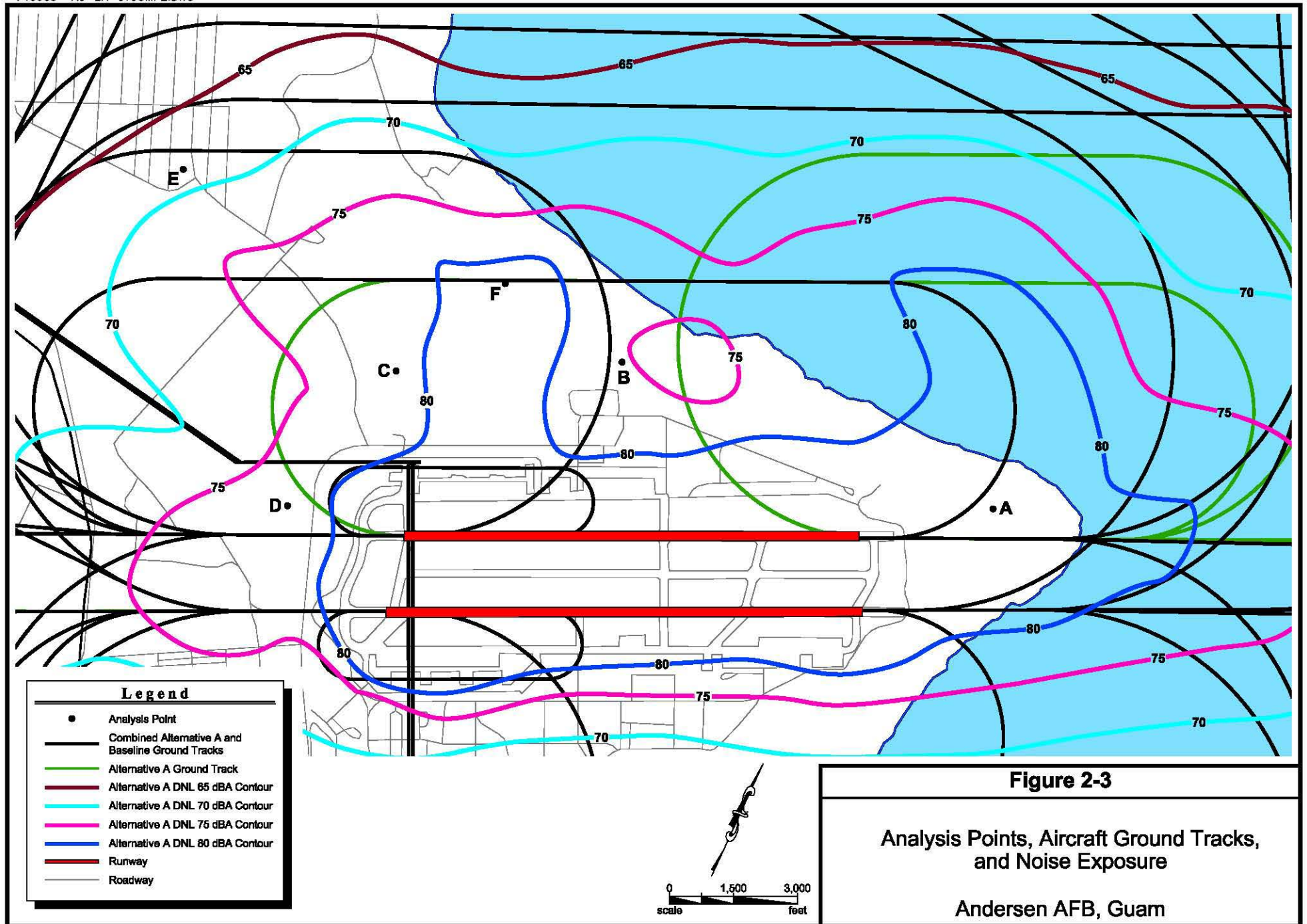
The number of fighter and tanker aircraft operations would increase as the number of aircraft increase throughout the implementation process. Table 2-3 presents the total airfield operations data for all aircraft operating at Andersen AFB after Phase 3 of the ISR/Strike is implemented. The additional operations associated with the implementation are identified in the table as “Net Change.” Andersen AFB has two runways, Runway 06Left(L)/24Right(R) and Runway 06R/24L. As indicated in Table 2-3, airfield operation events would increase on each runway under Alternative A when compared to the current condition, with the greater increase occurring on Runway 06L/24R, which is on the north side of the airfield. Although ISR/Strike bomber and tanker aircraft would also use Runway 06L/24R, it is projected the F-22 and F-15E aircraft would use the runway more often because it is nearer to the proposed ASA which would allow for shorter taxi times for the aircraft. Table 2-3 reflects the changes in terms of “day” and “dark,” which is the time between 30 minutes after sunset and 30 minutes before sunrise. “Day” is the time in a 24-hour day that does not occur during “dark.” Figure 2-3 depicts the two runways.

Table 2-3 Airfield Operation Events at Andersen AFB

Operations Condition	06L/24R		06R/24L	
	day	dark	day	dark
Arrivals				
Current Condition	1.98	0.22	12.64	1.41
Alternative A	16.11	1.06	17.22	2.68
Net Change	+14.13	+0.84	+5.08	+1.27
Departures				
Current Condition	day	day	day	day
Alternative A	1.88	0.21	12.75	1.41
Net Change	15.93	1.02	17.98	2.72
Current Condition	+14.05	+0.81	+5.23	+1.31
Closed Patterns				
Current Condition	day	day	day	day
Alternative A	63.04	7.01	10.49	1.17
Net Change	104.08	9.17	23.69	4.47
Current Condition	+41.04	+2.16	+13.20	+3.30
Total				
Current Condition	day	day	day	day
Alternative A	66.90	7.44	35.88	3.99
Net Change	136.12	11.25	59.39	9.87
Current Condition	+69.22	+3.81	+23.51	+5.88



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The addition of F-22 and F-15E airfield operations on Runway 06L/24R would require establishment of additional arrival, departure, and closed pattern flight tracks, and the closed patterns would occur to the north of the airfield. The new flight tracks are depicted as green lines on Figure 2-3. The current condition flight tracks are indicated as black lines on the figure.

Flying would occur 240 days per year for the fighter, tanker, and bomber aircraft, and 220 days per year for the UAV aircraft. The operations data in the tables in this BA are based on average busy day. Average busy day operations are calculated by dividing the total annual operations for each aircraft type by the number of days per year that type will fly. About 5 percent of the fighter sorties would be flown during “dark.” It is estimated that about 20 percent of the tanker, bomber, and UAV sorties would occur during “dark.”

There will be approximately 14 average busy day fighter sorties, half of which will be flown in the morning, and the other half flown in the afternoon/evening/night. Of the seven sorties flown during each flying period, typically four would be flown in a four-aircraft formation, two would be flown in a two-aircraft formation, and one sortie would be a single aircraft.

For the purposes of this BA, an aircraft operation event is one arrival, one departure, or one closed pattern. A closed pattern is a single event in which the aircraft takes off, turns at the end of the runway to parallel the runway in the opposite direction of the takeoff while climbing to an altitude of about 457 meters above ground level (AGL), and parallels the runway in the opposite direction of the takeoff until a descending turn is initiated to reverse course and align with the runway for the landing. The aircraft is positioned about 1 mile from and parallel to the runway when traveling in the opposite direction of the takeoff. Thus, a closed pattern event consists of two operations, *i.e.*, one takeoff and one landing.

Analysis points were established north of the airfield for noise analysis. The points were selected based on location of the Mariana fruit bat colony at Pati Point and known foraging sites identified by radio tracks of individual bats marked in a previous study. Table 2-4 lists the combined airfield operation events for all aircraft operating on the aircraft flight tracks within a 2,000-foot radius of the various analysis points. The analysis points are depicted on Figure 2-3.

Table 2-4 Airfield Operation Events on the Runway and at Points North of the Andersen AFB Airfield

Operations Condition	Point A			Point B			Point C		
	day	dark	total	day	dark	total	day	dark	total
Current Condition	1.8193	0.2087	2.0280	0.0734	0.0000	0.0734	87.1760	21.7940	108.9700
Alternative A	51.0438	2.8714	53.9152	43.5888	2.2903	45.8791	122.0600	23.6300	145.6900
Net Change due to Alternative	+49.2245	+2.6627	+51.8872	+43.5154	+2.2903	+45.8057	+34.8840	+1.8360	+36.7200

Table 2-4 Airfield Operation Events on the Runway and at Points North of the Andersen AFB Airfield (continued)

Operations Condition	Point D			Point E			Point F		
	day	dark	total	day	dark	total	day	dark	total
Current Condition	88.6380	22.0267	110.7007	0.1534	0.0200	0.1734	0.0000	0.0000	0.0000
Alternative A	144.0056	25.1047	169.1103	9.3842	0.5313	9.9155	34.8840	1.8360	36.7200
Net Change due to Alternative	+55.3677	+3.0419	+58.4096	+9.2308	+0.5113	+9.7421	+34.8840	+1.8360	+36.7200

Note: Data reflect operations on the aircraft flight tracks within a 2,000-foot radius of the point.

2.2 CONSERVATION MEASURES

The conservation measures described below are designed to reduce impacts to T&E species resulting from the proposed action, specifically the Mariana fruit bat (*Pteropus mariannus mariannus*), Mariana crow (*Corvus kubaryi*), Micronesian kingfisher (*Halcyon cinnamomina cinnamomina*), and the Guam rail (*Rallus owstoni*). The conservation measures, as components to the proposed action, correspond to recovery actions outlined in various USFWS recovery plans. Overall goals of the conservation measures contribute to important habitat and species management objectives on Guam, including BTS management and removal, habitat restoration and protection, feral ungulate impact reduction, and research.

2.2.1 Adjustment of the Construction Footprint

The construction footprint of the ASA, as shown in Figure 2-1, was altered from the first proposed design to reduce clearance within areas of relatively intact secondary forest.

2.2.2 Wildlife Management Specialist

Andersen AFB will secure funding to employ a full-time Wildlife Management Specialist who will also contribute to many of the conservation measures included in the proposed action. Details associated with the duties, goals, control methods, and results tracking for the Wildlife Management Specialist will be developed in conjunction with the next update to the Andersen AFB Integrated Natural Resources Management Plan (INRMP). A preliminary list of key duties of this position include the following:

- **Conduct and manage depredation hunts within ungulate exclosure areas.** Exclosure fencing construction will be in tandem with depredation hunts within proposed exclosure fencing (see Subchapter 2.2.3). Time-critical goals for eradication of deer and feral pigs within these areas will be outlined in a multi-year ungulate management plan (see Subchapter 2.2.4). The Wildlife Management Specialist will be responsible for organizing depredation hunts in partnership with Andersen AFB conservation officers.
- **Recording information on ungulate kills.** Measurements will be obtained from ungulate carcasses. These metrics will include sex of the kill, teeth measurements

appropriate for age determination, and cranium size, and will be made available to research specialists (see Subchapter 2.2.4).

- **Trapping of exotic predators.** The Wildlife Management Specialist will also be responsible for deployment and maintenance of traps designed for rodents, feral cats, and feral dogs. Ungulate enclosure areas will be prioritized for trapping.
- **Fenceline reconnaissance for maintenance.** During typhoon events in Northern Guam, intense and sustained wind speeds pose a significant maintenance concern for proposed enclosure fencing. A breach in a fenceline would present an opportunity for re-invasion of unwanted species. In addition to quarterly monitoring of the fenceline (through pedestrian surveys), fenceline inspection will be conducted by the Wildlife Management Specialist after episodic typhoon events.
- **Coordination with resource agencies.** The Wildlife Management Specialist will coordinate management activities with the appropriate cooperating resource agencies, such as USFWS, U.S. Department of Agriculture (USDA), and Government of Guam (GovGuam) Division of Aquatic and Wildlife Resources (DAWR).

2.2.3 Ungulate Enclosure Fencing

To offset the loss of habitat from clearing and aircraft operations associated with the proposed action, two units totaling approximately 200 hectares will be fenced to prevent incursion of deer and pigs. A depredation program would be managed by the Wildlife Management Specialist within enclosure areas. The intent of enclosure fencing is to facilitate forest regeneration without the presence of ungulate pressure, so emergent canopy species may be replaced by saplings. Figure 2-4 shows the location of two proposed enclosure areas in the Guam Natural Wildlife Refuge (GNWR) overlay, both near Ritidian Point and adjacent to the Ritidian Point unit. The Ritidian West Unit would fence 90 hectares, while the Ritidian East Unit would fence 110 hectares. This proposed enclosure will occupy land designated by the USFWS as “Priority 1” for recovery of the Mariana Crow (USFWS 2005b). Further, the Andersen AFB General Plan will be modified to include a special conservation designation for the enclosure areas.

Assuming that cliff lines can serve as effective barriers to ungulate entry, cliff lines will not be fenced. Leveraging cliff lines as barriers would reduce forest clearance and disturbance necessary for fence construction. The proposed enclosure fencing will involve construction of 3,400 meters of fenceline, using suitable posts and fencing material sufficient to prevent ungulate incursion and to withstand Guam’s environmental conditions (*e.g.*, sea spray, high winds, humidity). Construction will require removal of vegetation along 310 meters of fenceline, which amounts to 0.1 hectare (assuming a 3-meter buffer along the fenceline to allow for construction access). The remaining 3,090 meters of fenceline are along roads and through herbaceous areas, requiring little or no clearance. Approximately 1,600 meters of fenceline will be shared with ungulate enclosure fencing included in the proposed actions associated with Northwest Field. Fenceline routes will be surveyed prior to fence construction to plan for minor adjustments and construction planning.

Maintenance inspections of the fenceline will occur on a quarterly basis, as well as after episodic typhoon events. Fenceline breaks and preventative maintenance needs will be logged

during the inspections, and maintenance activities will be planned accordingly. Inspections of the fenceline will be assigned to the proposed Wildlife Management Specialist.

2.2.4 Ungulate Planning and Research

Impacts of high ungulate densities in northern Guam's limestone forest have been well documented (Morton, *et al.* 2000; Perry and Morton 1999; Schreiner 1997; Wiles 2005). Efforts to manage and control populations of ungulates include:

- **Development of an Ungulate Control Plan.** Coordination with resource agencies such as USFWS and DAWR will be sought to develop a multi-year ungulate control plan. The plan will be designed to guide the proposed Wildlife Management Specialist, Andersen AFB conservation officers, and other management stakeholders in efforts to eradicate deer and pigs within the ungulate exclosure area, and to reduce ungulate densities in non-fenced areas. Control and monitoring techniques will be clearly defined in the ungulate control plan.
- **Facilitation of Research.** The USFWS identified the need for ungulate movement studies to enhance current and future management strategies. Typically, these movement studies involve radio telemetry techniques and would be suitable for academic publication. The proposed Wildlife Management Specialist would provide technical support for such research activities, including anesthetizing deer and pigs for radio tagging. The proposed Wildlife Management Specialist may also provide technical assistance for "dressing" of carcasses for stomach content analysis or wildlife disease studies.

2.2.5 Transplanting of *Tabernaemontana rotensis* Seedlings and Saplings

There are at least 15 locations containing approximately 1,000 *T. rotensis* trees within the ISR/Strike area. The majority of the trees are saplings and the remaining are mature trees. *T. rotensis* saplings respond well to transplanting. A landscaping crew can remove the saplings and transplant them outside the project area(s). At the same time, a landscaping crew can collect *T. rotensis* seeds for outplanting outside the project area. This will offset removal of individual *T. rotensis* individuals during construction operations within the project areas.

2.2.1 Outplanting of Foraging Trees Important to Mariana Fruit Bat and Mariana Crow

This conservation measure will contribute to existing foraging habitat with native trees important to the Mariana fruit bat and Mariana crow. The goal of this conservation measure is to increase the attractiveness of habitat outside ISR/Strike project areas by establishing foraging plots within ungulate exclosures. Establishment of foraging plots will include:

- Five 50-meter by 50-meter foraging plots (Figure 2-4). A finalized list of tree species would be dependent on commercial nursery or herbarium stocks, and would involve coordination with USFWS, DAWR forestry personnel, University of Guam herbarium personnel, and the USDA Natural Resources Conservation Service field office;

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- Supplemental protective fencing to prevent browse pressure within foraging plots; and
- Management actions within these plots to include herbaceous vegetation control, fenceline maintenance, and quarterly monitoring of outplanting success.

Foraging plots as part of the proposed action associated with the ISR/Strike initiative will be additional to foraging plots as part of the proposed actions associated with Northwest Field projects.

2.2.2 Vegetation Surveys Relevant to Recovery of Mariana Fruit Bat and Mariana Crow

The limestone forest of northern Guam is not homogeneous in composition or structure. Quantification of the vegetation community types that cover Andersen AFB can aid in the proper allocation of resources for species management. Vegetation surveys of habitat areas for the Mariana fruit bat and Mariana crow will be conducted as part of the proposed action to target management resources for species recovery. These surveys will include:

- ***Vegetation assessment of occupied habitats of the Mariana fruit bat.*** The vegetation community composition and structure will be described and mapped as part of this survey. Goals of these efforts include assessment of locations for possible reestablishment attempts and detection of invasive herbaceous and woody species in essential habitat area. Survey areas will include Andersen AFB and the Ritidian Unit of the GNWR.

This vegetation assessment corresponds to Recovery Actions 2.1.2 and 3.1.1.2 of the USFWS Recovery Plan for the Mariana fruit bat (USFWS 1990b). A scope of work will be developed in cooperation with USFWS and DAWR. Modifications to the survey objectives will be concurrent with anticipated results from new research (Brooke 2005; Janeke 2005), as well as updates to recovery plans.

- ***Vegetation assessment of areas important to the Mariana crow.*** Goals of this vegetation assessment include determination of vegetation elements in need of management treatments within current and potential utilization areas of the Mariana crow. Survey areas will include Andersen AFB and the Ritidian Unit of the GNWR.

This vegetation assessment corresponds with Recovery Action 2.3.4 of the USFWS Recovery Plan for the Mariana crow (USFWS 2005b). A scope of work will be developed in cooperation with USFWS and DAWR to ensure that deliverables have maximum value to recovery efforts and can be integrated into existing data collection programs.

- **Base-wide inventories of trees of value to the Mariana fruit bat, Mariana crow, and Micronesian kingfisher.** Ongoing surveys for *T. rotensis* and *Cycas circinalis* may provide a template for the inventory of rare trees of value to listed species. Rare tree inventories will be conducted for *Pisonia grandis*, *Heritiera longipetiolata*, *Serianthes nelsonii*, *Artocarpus mariannensis*, and/or *Elaeocarpus joga*. Surveys for all these species can be conducted concurrently and could use the existing transects used in the *T. rotensis* surveys. These surveys will provide resource managers with

additional information about the relative scarcity of some species that may be important to the Mariana fruit bat, Mariana crow, and Micronesian kingfisher.

The rare tree inventories contribute to recovery actions associated with vegetation assessments and baseline habitat studies for the Mariana fruit bat, Mariana crow, and Micronesian kingfisher. Specifically for *S. nelsonii*, rare tree inventories correspond to Recovery Actions 1.1.1.1 and 1.3.1 of the USFWS Recovery Plan for *S. nelsonii* (USFWS 1994), which concern identification and inventory of newly discovered individual trees. Cooperation with USFWS and DAWR forestry personnel will be sought in developing the scope of work for these rare tree inventories.

2.2.3 Noise Study

Aircraft noise has the potential for effects to the Mariana fruit bat and the Mariana crow. A field study was conducted from October 1992 to September 1995 to assess the potential effects of aircraft overflights on the Mariana fruit bat and Mariana crow resulting from aircraft operations at Andersen AFB (Morton 1996). The types of aircraft and the level of aircraft operations expected under the ISR/Strike initiative would be different than those that occurred at the Base under the Morton (1996) study. Therefore, the data and results of the Morton study may not apply to the ISR/Strike aircraft operations condition. Surveys similar to those performed by Morton (1996) will be done prior to and during incremental increases of additional overflights at Andersen AFB. The noise study will focus on Mariana fruit bats near the main colony at Pati Point. Supplemental to field measurements of noise, surveys of reproductive success, and predator pressures will be concurrent with noise studies. Development of a scope of work and survey methods will be a cooperative effort with USFWS and DAWR. Replication of the Morton (1996) study would not be possible because the current mix of aircraft operating at Andersen AFB differs from when Morton collected data. In addition, procedural standards for acoustical studies have progressed since Morton's study. To be in line with current standards, enhancements to Morton's methods will include:

- **Sound level meter.** Morton used a class III Radioshack™ digital sound level meter which is not typically used in current acoustical studies. The American National Standard for sound level meters recommends the use of class I sound level meters. (ANSI S1.4-1983 [R 2001]).
- **Sound level meter height.** The recommended meter height for similar acoustical studies is 1.5 meters. The sound level meter height in the Morton study was 50 centimeters. The recommended height of 1.5 meters avoids ground reflectivity of sound (American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound Part 1: ANSI S12.9-1988, Part 2: S12.9-1992, and Part 3: ANSI S12.9-1003).
- **Aircraft altitude measuring.** Aircraft altitude was estimated in the Morton study. The new studies will use ground track data to supplement field estimations of aircraft altitude.

2.2.4 Environmental Education and Awareness Information

Information concerning conservation issues at Andersen AFB will be available to participants of training programs. Many pamphlets and posters have been produced by USFWS, USDA, DAWR, as well as the Andersen AFB conservation program. The intent of these publications is to increase awareness of environmental concerns among all new personnel associated with the ISR/Strike Initiative. Specifically, information accessible to trainees will contain:

- Pictorial references to T&E species, as well as other species of concern;
- General information on the conservation program at Andersen AFB;
- Instructions on how to avoid or reduce impacts to vegetation; and
- BTS identification and appropriate actions.

2.2.5 Brown Tree Snake Trapping at Pati Point

A recent census of Mariana fruit bat populations at the Pati Point colony reported less than 30 mature individuals and a complete lack of fruit bat pups (Dicke 2006). Predation by BTS on fruit bat pups is believed to be the primary factor for the absence of young individuals. This conservation measure proposes to trap BTS at the Pati Point colony, thereby reducing the threat posed to Mariana fruit bat pups by BTS predation. Existing traps will be deployed and maintained by the proposed Wildlife Management Specialist. Cooperation with relevant resource agencies will be sought to strategically place traps to maximize BTS trapping numbers.

2.2.6 Brown Tree Snake Interdiction and Control

The USDA Wildlife Services (USDA WS) operates a BTS interdiction and control program at Andersen AFB and at the commercial airport on Guam. The purpose of the interdiction and control program is to impede the spread of BTSs to other locations from the Andersen AFB passenger terminal and along flight lines to other locations. The USDA WS concluded that to effectively reduce the possibility of off-Base transport, a two-phase effort is required. The first phase is to establish BTS traps and conduct nightly spotlight searches around the perimeter of areas where cargo is loaded for transport. This has proved effective against snakes that immigrate into cargo areas, but does not protect against snakes stowed in outbound cargo. The second phase is to address snakes in outbound cargo, which requires an inspection program conducted on all cargo prior to leaving the island. The USDA WS uses trained dogs (Jack Russell terriers) to search for and detect snakes in outbound cargo. There are currently 14 inspection teams (a team consists of one handler and one dog) (Vice *et al.* 2004). Review of case histories of dog detections of BTSs on Andersen AFB from 1994 to 1996 reveals effectiveness in reducing spread of BTSs in cargo to vulnerable destinations (Engeman, *et al.* 1998). The Air Force has started the internal process to provide a five-year agreement with USDA WS for the use of Building 22002 on Andersen Main. It is anticipated that this agreement will provide enhanced infrastructure stability for the BTS interdiction program.

Brown tree snake control is a priority for the Department of Defense (DoD) (Krieg 2005). The Andersen AFB Draft Brown Tree Snake Control Plan is being put into place to ensure that

100 percent of out-bound craft (air and water) from Andersen AFB is inspected (USAF 2006). The Plan states, "All shipments by air or sea of material originating from Andersen AFB facilities for military exercise support, day-to-day military cargo and equipment and private contractors will be inspected by USDA WS personnel and/or their trained snake detection canines and properly document the inspection before transport off-island. All aircraft, military or civilian, taking off from Andersen AFB will be inspected by USDA WS to the maximum extent possible." The USDA notifies the Air Terminal Operations Center that the aircraft has been inspected, and the aircraft is marked off electronically in an Access database.

The role of the USDA includes:

- Utilize control and interdiction protocols on a daily basis by private sector contractors and military organizations and/or personnel from the USDA WS. The USDA WS is the primary federal agency responsible for ensuring the BTS does not leave the Island of Guam, and works cooperatively with the DoD to implement proactive control measures aimed at preventing BTS dispersal.
- Require 100 percent of aircraft and cargo destined for off-island locations to have a BTS inspection. USDA WS personnel require a minimum of 2 hours' notice for inspections and will have detector canine teams available 7 days a week, 24 hours a day.

The role of the DoD includes:

- Plan, direct, and coordinate all handling procedures for cargo departing Guam with consideration for the on-going threat of spreading the BTS to other Pacific islands. Ensure that cargo handlers and/or managers work closely with USDA WS personnel to establish and maintain effective cargo and equipment BTS inspection processes. The agency responsible for the BTS inspection or staging area will coordinate for and provide area lighting when needed.
- Fully cooperate with USDA WS to conduct measures necessary to reduce the BTS population at port and cargo facilities through an integrated approach consisting of technical assistance and lethal and non-lethal control methods such as prey base reduction, exclusion, habitat modification, and capture.
- Provide USDA WS with adequate forward notification of cargo movements not part of typical daily operations and assist them as necessary to facilitate the timely completion of the mandatory inspection process.
- As part of major exercise planning, address BTS control and interdiction procedures in the exercise plan's AF Form 813, *Request for Environmental Impact Analysis*, in consultation with USDA WS.

In addition to these procedures, the USDA WS and DoD will coordinate educational programs to obtain and disseminate materials related to BTS education and awareness. These programs will include:

- Publish and distribute the BTS Emergency Response Protocol. Prominently display contact information and telephone numbers to report BTS sightings.

- Conduct information briefings for both permanently assigned and transient personnel based on materials provided by 36 CES/CEV and USDA WS. Explain the potential for impacts by BTSs being transported from Guam in military vehicles, cargo, and equipment. Explain individual responsibilities if and when a BTS is sighted (kill/capture/immediately report to USDA WS). Use the BTS Awareness instructional videotapes and printed materials, requesting USDA WS participation and/or demonstrations at briefings when workloads permit.
- Provide information cards to personnel as a reminder of the threat and responsibilities for immediate action.
- Clearly display BTS identification and information posters in tent cities, dormitories, and work sites.

There are specific inspection procedures in the Draft Brown Tree Snake Control Plan for different types of cargo (USAF 2006). The cargo inspection procedures, USDA notifications, Documentation Requirements and Authority to Stop Movement directives are summarized below.

Inspection Procedures:

Aircraft: 100 percent of aircraft departing Andersen AFB are required to be inspected with detector dogs before departure.

The exemptions to the above are: 1) Aircraft flying local missions not scheduled to land off-island are exempt from BTS inspection; 2) since BTS are nocturnal, quick turn-around aircraft that remain on the ground less than 3 hours during daylight do not require BTS inspection; 3) commercial aircraft that remain on the ground less than 3 hours during night time (any time on the ground between official sunset and sunrise) will undergo a visual BTS inspection. Commercial aircraft remaining longer than 3 hours will be prepared for a canine inspection; and 4) urgent missions, such as MEDEVAC, will not be delayed to accomplish a BTS inspection. However, every effort will be made to conduct inspections on these aircraft prior to their scheduled departures

Incoming aircrew notifications will have the following requirements in the appropriate Flight Information Publications: “All aircraft departing Andersen AFB are required to have a brown tree snake inspection conducted by USDA WS. Changes in scheduled departure time require three hours’ prior notice to ensure timely accomplishment of this inspection”

Aerial Port Cargo: Aerial port cargo includes general freight, household goods, and unaccompanied baggage. This cargo will be inspected at the 734 Air Mobility Squadron warehouse facility, which includes inspecting all boxes for holes, tears, cracks, punctures, or other damage that may allow BTS access. Personnel will inspect all shipments throughout the selection, palletizing, building and loading process, and will handle and stack each sealed box individually while building up pallets. The warehouse facility and cargo yard will be inspected for BTS three times a day during the week, and twice a day on weekends.

Munitions Shipments: Munitions movements typically consist of either break-bulk/uncontainerized or International Organization for Standardization container movements. Munitions pallets will be staged in a nearby area conducive to inspections; canine inspections will be conducted on all munitions pallets prior to loading for transport to the Navy’s Kilo

Wharf. USDA WS canine inspections will be conducted on munitions while at the staging area before they are loaded.

Containerized household goods: Packing and loading of all household goods at the Base, including unaccompanied baggage, are accomplished by carriers/local agents before the goods are surface-transported to the port for shipping. USDA WS will promote BTS education and training to local agent/carrier employees. Items of greatest concern are those that have been stored outdoors or in carports and sheds, such as washers, dryers, swing set tubing, lawnmowers, barbeque grills, lumber, pipes, garden hoses, and vehicles. Personnel will be advised that USDA WS will come to their residences to inspect for the presence of BTSs, where possible. If not possible to search every residence for BTSs due to workload, the highest priority household goods will be inspected, particularly those goods destined for Hawaii and Diego Garcia. A significant component of the movement process, personally owned vehicles, are handled through a single Navy facility at COMNAVMARIANAS. Vehicles departing Guam are not inspected at Andersen AFB.

USDA Notifications:

Aircraft: Airfield management will make a printed copy of the consolidated daily flying schedule available to USDA WS no later than 0600 each day. The USDA WS will be notified as soon as possible of any changes to the flight schedule. Failure to provide more than 2 hours' notification may result in a stop movement until an inspection can be conducted.

Aerial Port Cargo: Load planners will notify USDA WS when load plans are complete, approximately 4-6 hours before departure. Notification will either be in person if USDA WS personnel are present, or by phone when necessary.

Munitions Shipments: Shipping dates for munitions will be provided to USDA WS a minimum of 30 days in advance. Because projected shipping dates will be tentative, USDA WS will request further updates from shipping personnel, who will provide a firm target date for all munitions shipments at least 7 days in advance (unless the shipping personnel are advised of a short-notice shipment, in which case they will notify USDA WS immediately) and a minimum of 3 hours' notice for any inspections desired on that date.

Containerized Household Goods: USDA WS will be provided with a schedule of the upcoming week's container movements every Friday; in addition, the USDA WS will be provided with a daily detailed schedule that identifies the type of shipment, carrier, and estimated weight for each of the next day's packouts and container movements.

Documentation Requirements:

Aircraft: USDA WS will notify the 36th Wing Command Post upon completion of each aircraft inspection. The Command Post will annotate completed inspections in the Access database, annotating the entry with the initials or name of the USDA WS employee making the notification. The Access database will be visible to authorized users.

Aerial Port Cargo: The load planner will annotate the load plan with the time and name of the person notified. Upon completion of the inspection, USDA WS will notify the Command Post. The Command Post will update the central inspection database accordingly.

Munitions Shipments: The appropriate munitions personnel will make an entry in the BTS log that identifies the USDA WS inspector for that day's shipment as well as the approximate time the inspection was conducted, which will then be initialed by the handler conducting the inspection. The USDA WS inspector will coordinate with munitions personnel to schedule an end-of-day verification of loaded munitions status. An entry will be made into the BTS log verifying that all containers containing munitions packed for shipment were closed prior to darkness, and the approximate time those containers were closed; USDA WS will authenticate this entry by initialing it.

Containerized Household Goods: USDA WS will make a copy of the weekly schedule and annotate each shipment inspected, including the inspector's name or initials. The USDA WS will provide this documentation to the Base, which will maintain it on file for at least 1 year.

Authority to Stop Movement:

Aircraft: Upon request of the USDA WS, the Installation Commander has delegated authority to the 36th Operations Support Squadron (36 OSS), made either directly or via the 36th Wing Command Post, to stop any aircraft from departing Guam that has not been inspected and/or is suspected of harboring BTSs.

Aerial Port Cargo: The Installation Commander has delegated authority to the 36 OSS Commander or his designated representative, upon a request by USDA WS made either directly or via the air terminal operations center, to stop any aircraft from departing Guam with any cargo or equipment that has not been inspected and/or is suspected to harbor BTSs. Air terminal operations center personnel are required to notify USDA WS and 36 OSS Airfield Management if cargo about to be loaded onto an aircraft or vehicle has not undergone the appropriate BTS inspection.

Interdiction and control of the BTS are both important in enhancing the recovery of endangered bird species on Guam, as well as preventing species on other islands from becoming endangered due to the transport of the BTS away from Guam. Procedures outlined in the Brown Tree Snake Interdiction Plan correspond directly with recovery actions outlined in USFWS recovery plans for the Mariana fruit bat and the Mariana crow (USFWS 1990b; USFWS 2005b).

2.2.7 Adaptive Management and Ground Track Modification

Adaptive management is a process that allows for development and implementation of natural resource management strategies in response to a degree of biological uncertainty. Adaptive management involves two basic tenets:

- A commitment to a continual learning process, a reiterative evaluation of goals and approaches, and redirection based on an increased information base (Baskerville 1985); and
- Explicit hypotheses regarding ecological structure, function, and anticipated response of variables within an ecosystem (Holling 1978; Walters 1986).

This conservation measure proposes to use data from the proposed noise studies (Subchapter 2.2.8) to modify aircraft ground track location and flight profile (*i.e.*, airspeed

and/or altitude) using an adaptive management strategy provided the change would not constitute a flight hazard or noncompliance with the aircraft flight manual. Habituation of Mariana fruit bats to noise is suspected (Janeke 2005); however, the degree of habituation represents a data gap in the current literature. As aircraft overflights increase, management recommendations will be submitted to modify existing flight tracks and profiles.

CHAPTER 3 ECOLOGICAL SETTING

3.1 HISTORIC VEGETATION / PRIMARY GROWTH LIMESTONE FOREST

Historically, tree species in the native forest of Guam would have been broadly classified based on underlying soil type, the northern limestone vegetation, and the southern volcanic vegetation (Fosberg 1960; Donnegan, *et al.* 2004). Andersen AFB is entirely within the northern limestone vegetation area. The northern half of Guam is generally flat limestone with abrupt cliffs and dropoffs toward the ocean. The underlying limestone may be strongly weathered into a karst formation, and the vegetation would typically have been forests. The primary growth limestone forest of the northern portion of Guam was a tall, closed canopy forest dominated by very large *Artocarpus mariannensis* (dugdug) and *Ficus prolixia* (nunu) trees. In addition, several other species were probably well-represented throughout the plant community, including *Elaeocarpus joga* (yoga), *Instia bijunga* (ifil), *Neisosperma oppositifolia* (fagot), *Trisiropis obtusangula* (faniok), and *Pisonia grandis* (umumu) (Fosberg 1960). Throughout northern Guam, these species would have formed a nearly contiguous canopy 15 to 20 meters tall. However, typhoon winds may blow down clusters of trees, making gaps in the forest canopy where understory vegetation could proliferate and seedlings of canopy species could germinate (Andersen AFB 2003; Quinata 1994). The modified forest that regenerated after typhoons were historically composed of a denser understory vegetation, including ferns, herbaceous vegetation, and small shrubby species (Quinata 1994) which supported native bird and animal species. Some portions of northern Guam still contain forests that can be considered primary growth forest and typhoon-modified forest (Fosberg 1960; Quinata 1994; Lujan 2005).

3.2 SECONDARY GROWTH LIMESTONE FOREST

Historic actions on the northern half of Guam about 60 years ago included clearing the native limestone forest of trees, understory, and shrubs, and grading the surface. Imported fill of crushed coral and argillaceous clay was placed and compacted over pulverized limestone to stabilize runways, taxiways, and aprons (USAF 2000). The area cleared included most of what is now Andersen AFB. The two airfields constructed on Guam were Northwest Field and North Field. Andersen main, including the North Field area, has remained active, with most of its operations and support facilities being in developed areas maintained as an urban landscape.

Where extensive areas of hard limestone were scraped clean, disruption of the natural seral succession processes in the forest created a considerably modified secondary forest (Fosberg 1960). The resulting secondary growth forest has a thinner and more irregular canopy, and is shorter than the native forest. After clearing of the native forest, the native tree species were primarily replaced by smaller native trees and shrubs in higher abundance, including *Pandanus tectorius* (kafu), *Pandanus dubious* (pahong), *Ficus tinctoria* (hodda), *Hibiscus tiliaceus* (pago), and *Casuarina equisetifolia* (gagu).

After clearing, the forest understory was also subject to invasion by non-native plant species, including *Bidens alba*, *Chromolaena odorata* (kesengasil), *Stachytarpheta cayennensis*, *Ipomaea indica*, *Passifolia foetida* (kinahulo), *Passifolia suberosa*, *Operculina ventricosa* (alalag), *Cestrum diurnum* (tintanchina), *Muntingia calabura* (mansanita), *Triphasia*

trifolia (lemondichina), *Leucanea leucocephala* (haole koa), and *Caesalpinia major* (pakao). Woody species such as *L. leucocephala* quickly formed a major component of open xeric areas, and *Vitex parviflora* (lagundi) dominated upper and mid-canopies of denser forests (Fosberg 1960; Space and Falanruw 1999).

Further, invasive ungulate species greatly reduced recruitment of native limestone woody species into the upper canopy, thereby altering forest composition and structure. For example, in 2005, Wiles identified ungulate pressure as the major factor for inhibiting recruitment of the native *Artocarpus mariannensis* tree (Wiles 2005). Wiles documented a decrease in *Artocarpus mariannensis* trees within the MSA from 549 individual trees in 1989, to 190 trees in 1999, a 65.4 percent decrease. In the MSA, ungulate densities are reported to be 183 Philippine deer (*Cervus mariannus*) per square kilometer, and 38 feral pigs (*Sus scrofa*) per square kilometer (Brooke 2005; Knutson and Vogt 2002). Other declining native trees in secondary forests due to lack of recruitment include the *Serianthes nelsonii* (hayun lagu), *E. yoga*, *Heritiera longipetiolata* (ufa halomtano), *P. grandis*, *Barringtonia asiatica* (puting), *T. obtusangula*, and *I. bijunga* (Wiles, *et al.* 1995; Wiles 2005; Schreiner 1997; GovGuam DAWR 2005).

The introduced BTS (*Boiga irregularis*) indirectly affected forest composition and structure by eliminating a great many forest bird species (Savidge 1987). Birds and fruit bats are important in secondary limestone forests because they naturally pollinate and disperse seeds of shrubs and trees and thereby help maintain forest diversity (Wiles *et al.* 1995; Cox and Elmqvist 2000), contributing to recovery after typhoons and perturbations. The loss of most insectivorous birds may leave secondary limestone forests vulnerable to a variety of insect pests. With the absence of insect predators, insects arriving on Guam in ships or planes are potentially more likely to become established and threaten native woody species.

Among introduced invertebrates affecting secondary limestone forest species, the introduced Asian cycad scale (*Aulacaspis yasumatsui*) has effectively removed the native *Cycas circinalis* (fandang) from mid and lower canopies, where it once was a dominant tree species. This scale was first noted in Guam in 2003; *C. circinalis* suffers a mortality rate of 100 percent in infected areas (Moore 2005).

3.3 REMAINING INTACT FORESTED AREAS

There are tracts of land adjacent to the cliff lines that have not been extensively modified. These areas were not extensively cleared, possibly because the karst topography and steep cliffs made the area difficult to clear and of doubtful purpose. These areas provide some of the best remaining habitat. Most of these areas are now considered Natural Areas, and are protected from future human disturbance activities (*e.g.*, construction and development). Due to its proximity to Andersen main, Pati Point Natural Area is one area of special concern. The vegetation communities of Pati Point can most accurately be described as *F. proluxa* forests, with tall canopy trees. Other species may include *Mammea odorata* (chopak) and *N. oppositifolia* (USFWS 1990a). Additional vegetation communities include forest types dominated by *M. odorata* along the cliff line, and *N. oppositifolia* forest toward Tarague Basin. The Pati Point Natural Area is also directly under a current flight line from Andersen AFB.

3.4 VEGETATION COMMUNITY TYPES

Fosberg's classification (1960) of primary and secondary limestone forest set the baseline for the description of Guam's forests. Secondary limestone forests may be classified into secondary woody limestone community, secondary shrubby limestone community, and herbaceous scrub. Based on published descriptions (Donnegan, *et al.* 2004) and conversations with local conservation personnel familiar with the vegetation at Andersen main (Lujan 2005), the two secondary growth communities were further classified into the following vegetation community types:

Secondary Woody Limestone:

- *Aglaia-Guamia* Forest
- *Neisosperma* – *Macaranga* Forest
- *Guamia* Forest
- *Guamia* – *Premna* Forest
- *Vitex* – Remnant *Elaeocarpus* Forest

Secondary Shrubby Limestone:

- Hibiscus – *Leucaena* Shrub Forest

Herbaceous scrub vegetation community is characterized by a dominant herbaceous species such as dense stands of *C. diurnum*, *B. alba*, *C. odorata*, *S. cayennensis*, with occurrences of *H. tiliaceus*, *Morinda citrifolia* (lada), *T. trifolia*, *P. tectorius* and *P. dubious*.

3.5 GUAM NATIONAL WILDLIFE REFUGE

The GNWR was established in 1993 to protect and recover T&E species, protect habitat, control non-native species (with an emphasis on the BTS), protect cultural resources, and provide public recreational and educational opportunities.

The GNWR contains eight management units. The Ritidian Unit is a 312-hectare tract composed of coral reef and terrestrial habitat wholly owned by the USFWS. The remaining seven management units contain 9,088 hectares of land owned by the Air Force and Navy (overlay units), and are classified as overlay refuge units. USFWS has consulting rights and management obligations on all overlay refuge land. Approximately 4,168 hectares of Andersen AFB are classified as overlay refuge land. Figure 3-1 shows the location of the GNWR management units on Guam and the overlay refuge on Andersen AFB.

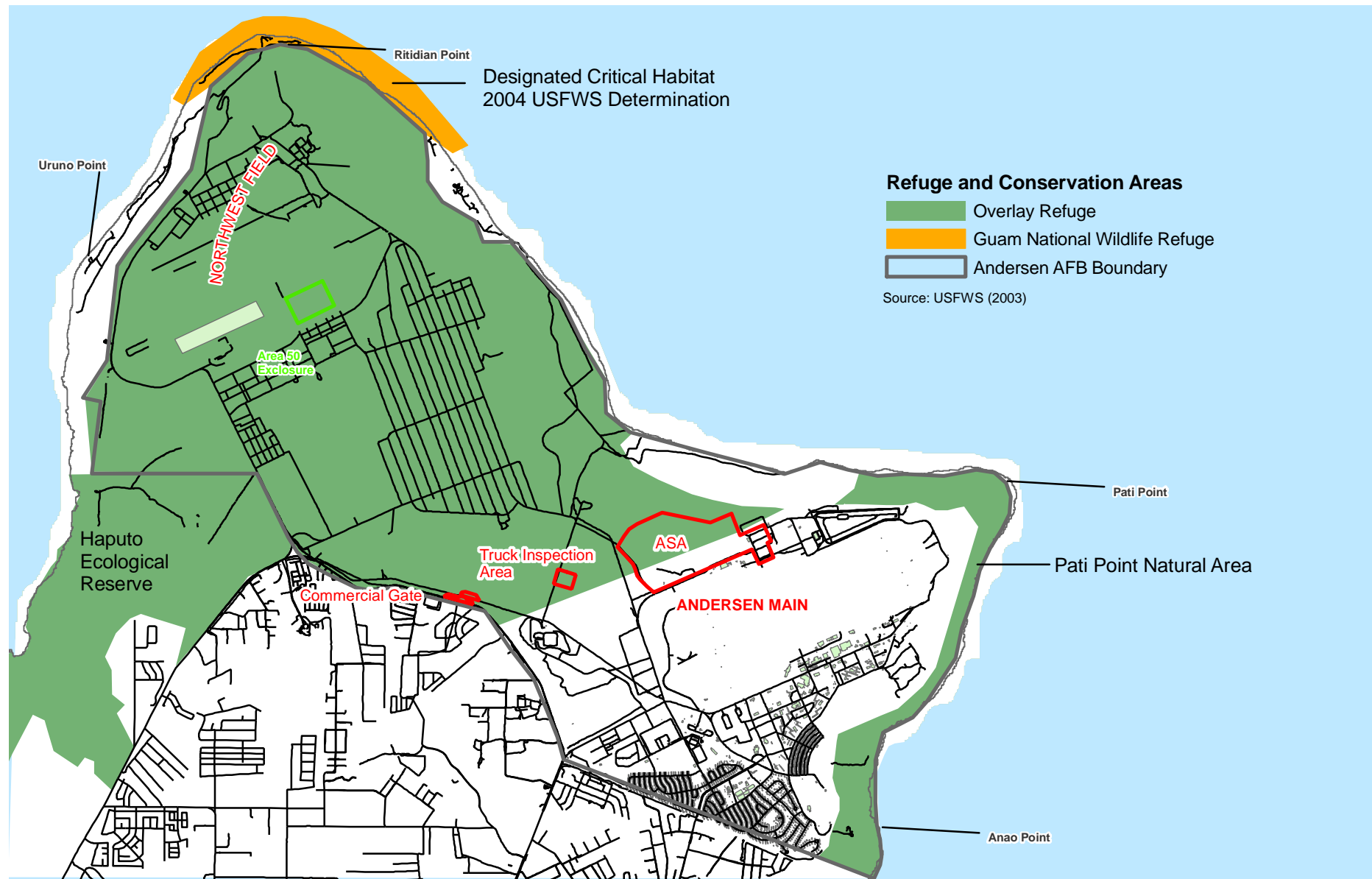
3.6 CRITICAL HABITAT DESIGNATION

In 2004, USFWS designated 162 hectares of terrestrial habitat within the Ritidian Unit of the GNWR as critical habitat for the Mariana fruit bat, Mariana crow, and Micronesian kingfisher (USFWS 2004b). Although the three species utilize the habitat in slightly different ways, the area designated as critical habitat contains suitable habitat for all aspects of the life cycle of all three listed species, including suitable foraging trees, nesting trees, and roosting trees. Critical habitat designations are pursuant to 4(b)(B)(2) of the ESA. Before the USFWS designation of critical habitat in 2004, the 4,168-hectare portion of the GNWR overlay on Andersen AFB was proposed to be designated as critical habitat. The Andersen AFB INRMP

exempted the GNWR overlay from the USFWS critical habitat designation (Andersen AFB 2003). The INRMP provides provisions for the USFWS to proactively manage the GNWR overlay and assist Andersen AFB with natural resource coordination at an early stage of project planning (Andersen AFB 2003). Figure 3-1 shows the critical habitat location relative to Andersen AFB.

3.7 HUNTING AREAS

Hunting may have provided some degree of reduction or control of deer and feral pigs, and both species continue to be hunted on Andersen main; however, hunting is restricted to bow hunting by Base personnel. A GovGuam hunting license and Andersen AFB hunting permit are required to hunt on designated segments. Due to safety and security concerns, the ASA of Andersen main will be closed to public hunting. As a result, 136.7 hectares of a total 855 hectares will be removed from hunting on Andersen main (Andersen AFB 2003). This area removed from hunting accounts for the total ASA project area, which includes areas subject to clearance activities. Recreational hunting will continue at the same level in the existing hunting units that remain open. The result will be fewer deer and pigs being removed because fewer hunting units will be available (Lujan 2005). The public and restricted hunting areas on Andersen AFB, and the units that will be removed from hunting at Andersen main, are shown in Figure 3-2.



1

SCALE = 1 : 75,000

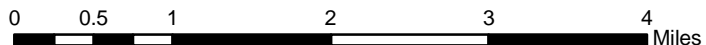
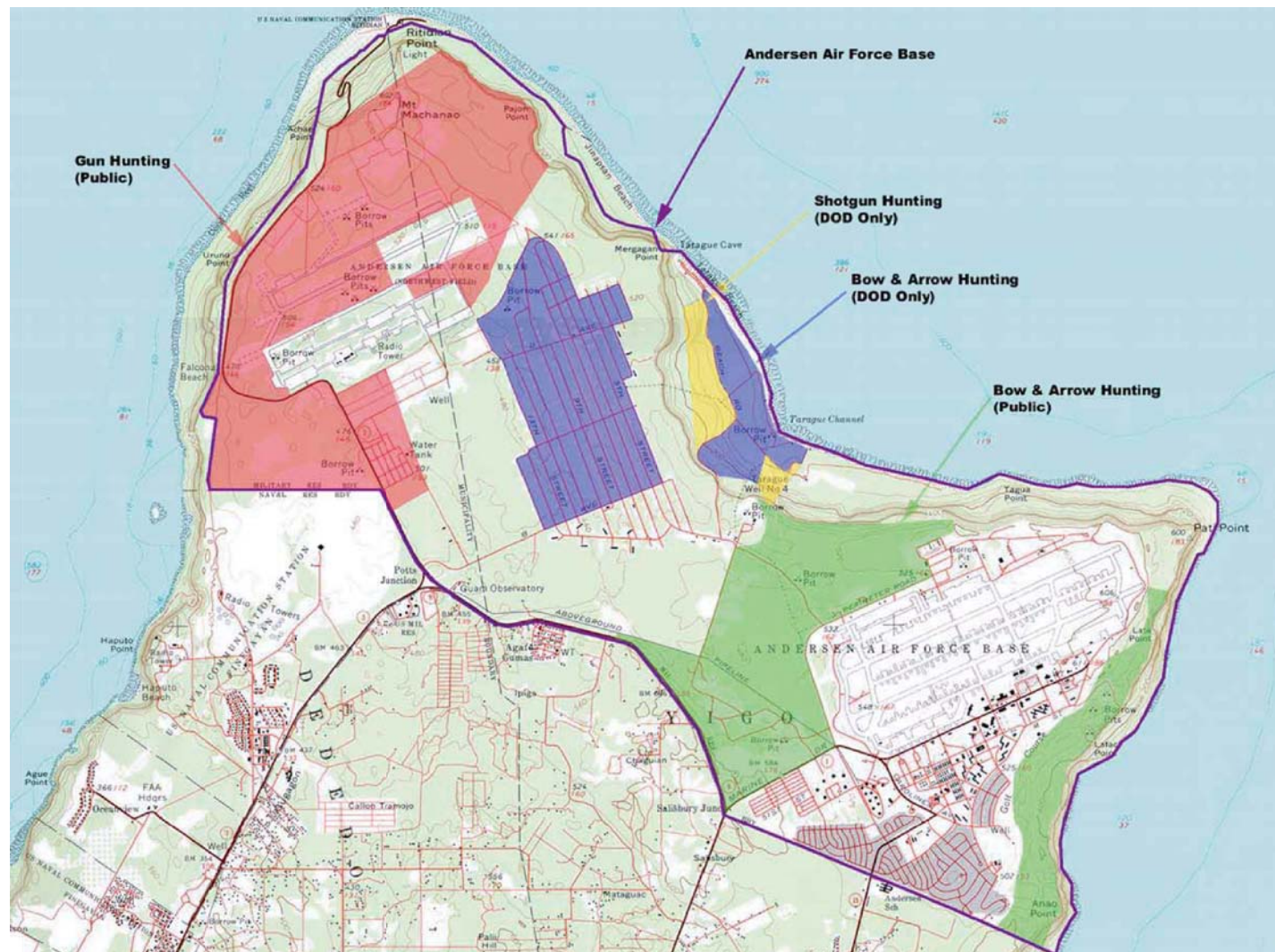


Figure 3.1

Guam National Wildlife Refuge Overlay

Andersen AFB, Guam

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Source:
Integrated Natural Resources Management Plan, Andersen AFB, Guam - Department of
the Air Force 36th Air Base Wing Civil Engineer Squadron, December 2003.

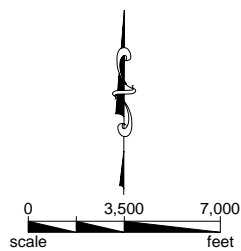


Figure 3-2

Public Hunting Areas

Andersen AFB, Guam

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CHAPTER 4 INTERRELATED STUDIES

This section contains a summary of environmental studies relevant to species under consideration in this BA. These documents contain information applicable to T&E and sensitive species management, as well as invasive species management and environmental conditions at Andersen Main.

4.1 UNGULATE SURVEYS, MUNITIONS STORAGE AREA, ANDERSEN AFB

Surveys of Philippine deer and feral pig populations have been conducted in the MSA (Knutson and Vogt 2002). The surveys were conducted to determine absolute population numbers and estimate harvest goals to alleviate browsing and rooting damage to native vegetation. The surveys determined that deer and pig densities (183 deer/km² and 38 pigs/km², respectively) were among the highest anywhere in the world.

4.2 EFFECTS OF AIRCRAFT OVERFLIGHTS ON ENDANGERED MARIANA FRUIT BAT AND MARIANA CROW

The effects of aviation noise on animals have been studied rather extensively over the past 20 years, with much of the work being conducted by Air Force-sponsored researchers. The studies have revealed that the effects are highly species-dependent and that the degree of effect may vary widely. Responses of animals to aircraft noise vary from almost no reaction to virtually no tolerance of the sound. The question of how adaptable animals are remains largely unanswered. Both wild and domesticated animals have been studied, though more research has centered on domesticated or laboratory animals (such as rats and mice).

To assess the potential effects of aircraft overflights on the Mariana fruit bat and Mariana crow, a field study was conducted from October 1992 to September 1995 (Morton 1996). The study collected data on the behavior of nesting crows as nests were discovered. The nest characteristics and woody vegetation in 500 square meter plots around each nesting tree was described. Data on noise generated by different aircraft were collected during a 3-week period in September 1992.

The Morton (1996) study determined that, in general, some Mariana crows nesting under a flight path responded negatively to the aircraft overflight, while others showed no obvious behavioral response. Although Morton (1996) suggested that aircraft noise was an important factor in nest abandonment, observations during the study observations suggested there may be a cumulative effect of several factors, including aircraft noise, human activities, and attempted predation that led to nest abandonment. Despite these cumulative effects, most pairs attempted re-nesting shortly after they abandoned the first nest.

During the Morton (1996) study, data were collected on behavior and diurnal time budgets of Mariana fruit bats in the colony near Pati Point. There were increased activity levels for the bats at Pati Point during the day due to aircraft overflights, which Morton (1996) suggested may be energetically costly for the bats. Morton (1996) also suggested that bats appeared to tolerate the number of aircraft overflights at the time, but if more overflights were conducted, the energetic cost of the disturbances might cause the bats to abandon the roosting colony.

4.3 SURVEYS OF MARIANA FRUIT BAT, ANDERSEN AFB

Recent surveys of areas throughout Andersen AFB were conducted by Janeke (2005) to determine locations and flight directions of the federally listed Mariana fruit bat. Individual bats were observed foraging during nighttime surveys in the ASA (Brooke 2005). Preliminary results from the surveys suggest there may be some vegetation in the ASA suitable for foraging. In addition, data suggest bats move around during both the day and nighttime in other parts of the Base, and that there may be some bats that solitary roost rather than in colonies.

4.4 NORTHERN GUAM MARIANA CROW SURVEYS AND TRANSLOCATIONS

The DAWR conducted crow surveys throughout northern Guam to determine population size and status of known Mariana crow individuals. In addition, DAWR translocated individuals from Rota to Guam to increase the Guam population size. The most recent survey data available suggest that in 1999-2000, there were seven Mariana crows found on Guam, and there were no active nests located during that time (GovGuam DAWR 2000a). The report recommended discontinuing surveys and following known individuals. During the same time, DAWR attempted translocation of seven juvenile birds into the MSA. At least two of those individuals died of unknown causes, and results are not available for the remaining birds (GovGuam DAWR 2000b). DAWR is continuing to follow known individuals and translocations from Rota released in 2005, but the results have not been published (Dicke 2005).

4.5 BTS CONTROL PROGRAMS

In addition to trapping and detector dogs, toxicants have been studied as a BTS control (Brooks *et al.* 1998; Savarie, *et al.* 2001). These studies suggest the following:

- ***Use of Acetaminophen-laced bait is an effective control method.*** Acetaminophen was found to be acutely toxic to the BTS (Savarie, *et al.* 2001), and an 80-mg dose of acetaminophen orally delivered to BTSs resulted in 100 percent mortality within 24 hours (Savarie, *et al.* 2001). Acetaminophen in baited mice was distributed throughout the MSA as a control method in one study (Savarie, *et al.* 2001).
- ***Acetaminophen-laced bait is target-specific.*** Additional testing determined that the risk to non-target species (*e.g.*, the Fish crow [closely related to the Mariana crow], feral dogs, coconut crabs) was very low, suggesting that acetaminophen mouse baits may at least reduce population sizes of the BTS (Johnston, *et al.* 2002), particularly when used in conjunction with other trapping.

4.6 USFWS RECOVERY PLANS

The USFWS released the following recovery plans for species on Guam, relevant to this BA:

- **Recovery Plan for the Mariana Fruit Bat (Guam Population) and Little Mariana Fruit Bat (USFWS 1990b).**

This plan identifies conservation actions necessary for the delisting of the Mariana fruit bat. These actions include eliminating the threat of poaching, BTS control, control of other exotic predators, research of bat population ecology, management activities and bat reintroductions. Conservation measures described in Subchapter 2.2 support the Recovery Actions for the Mariana fruit bat.

- **Draft Revised Recovery Plan for the Aga or Mariana Crow (USFWS 2005b).**

Recovery actions outlined in this plan to prevent extinction of the Mariana crow include BTS research and control, protection and management of associated habitat areas, and focused research concerning population declines on Rota. The plan addresses the need to reduce BTSs over extensive areas of northern Guam, interdiction of BTSs at ports and cargo areas, and eradication of incipient BTS populations on Rota. Habitat protection and management measures include the control of ungulates within habitat areas and coupling ungulate exclosure fencing with ungulate removal. Population studies on Rota would require a senior-level scientist to conduct research of non-BTS limiting factors, such as rats, as well as continued surveys of the Rota crow population, and establishment of a Mariana crow data center. This Rota-based research is relevant to crow recovery on Andersen AFB because non-BTS predator populations would be expected to increase as BTS control programs develop.

The plan also identifies recovery zones ranked by priority for specific conservation efforts. All three recovery zones contain habitat important to recovery of listed species, and were intended to focus and guide recovery efforts to those areas with the highest potential for recovery, but not intended to suggest that one area was more important than another. Priority 1 recovery zones are areas where crow habitat is less disturbed by human activity and requires the least restoration efforts. Priority 2 recovery zones are areas where the habitat has been subjected to relatively moderate disturbance and requires a moderate level of restoration efforts. Priority 3 recovery zones are habitat areas subjected to more intensive disturbance activities and require significant restoration efforts. Conservation measures described in Subchapter 2.2 support the Recovery Actions for the Mariana crow.

- **Draft Revised Recovery Plan for the Sihek or Guam Micronesian Kingfisher (USFWS 2004d).**

Recovery actions outlined in this plan include increasing the size of the captive breeding population, controlling BTS, protecting and enhancing habitat, followed by reintroduction of kingfishers in suitable habitat.

- **Recovery Plan for *Serianthes nelsonii* (USFWS 1994).**

This plan identifies conservation actions necessary for downlisting this tree species from Endangered to Threatened. These actions include securing habitat of current populations and management of potential threats, research of limiting factors, supplementing existing populations with outplantings, and monitoring of recovery efforts.

- **Draft Recovery Plan for the Mariana Islands' Population of the Vanikoro swiftlet, *Aerodramus vanikorensis bartichi* (USFWS 1987b).**

Recovery actions outlined in this plan include management of known caves for nesting habitat, additional cave/karst surveys for suitable for nesting, development of reintroduction techniques, and population monitoring.

- **Recovery Plan for Native Forest Birds of Guam and Rota of the Commonwealth of the Northern Mariana Islands (USFWS 1990a).**

This plan addresses efforts necessary for recovery of the Guam broadbill, Guam bridled white-eye, Guam rail, Micronesian kingfisher, and the Mariana crow. Recovery criteria include eradication or control of BTS, and the reestablishment in northern Guam of 1,000 Guam rail; 1,000 Micronesian kingfisher; and 500 Mariana crows. No recovery objectives were set for the Guam broadbill or the Guam bridled white-eye since these two species are thought to be extinct. Additional measures include researching forest habitat, followed by management activities.

CHAPTER 5 METHODS AND RESULTS

The current condition and presence or absence of T&E or sensitive species or habitat were determined through literature review and biological surveys of the project areas. Suitable habitat was determined through surveys to locate indicator plant species (*e.g.*, those species used for roosting, nesting, or foraging), rather than the T&E species itself. In addition to suitable habitat, federally listed T&E species and locally sensitive species may be affected by deer and feral pigs and, in some cases, BTSs. Therefore, surveys include the invasive deer and pigs and their control status.

5.1 USE OF DATA AND INFORMATION

The data and information in this chapter were used as the basis for determining the potential for presence or absence of T&E and sensitive species within the ASA and Commercial Gate project area.

The likelihood for T&E and sensitive species to occur in the area of the ASA could be substantially determined from literature reviews, communications with personnel at the site (including Andersen AFB environmental officers, DAWR scientists, and University of Guam researchers whose study sites are located on or near the ASA and Commercial Gate).

Analyses of aerial photographs and development of vegetation maps to broadly determine where species could be expected to occur, and to concentrate field surveys on areas where actions are expected to occur. A field survey was conducted in January 2006 (described separately in Subchapter 5.3).

5.2 HABITAT REQUIREMENTS OF SPECIES CONSIDERED IN THIS BA

This BA considers three plant species, one mammal species, three bird species, three snail species, and one insect species federally listed as T&E or locally important. There are also three invasive species considered in this BA that may be displaced or disrupted due to the proposed action on Andersen main. The following paragraphs briefly summarize the life history and habitat requirements of the species addressed in this BA.

Table 5-1 shows the presence/absence of suitable habitat and species based on literature review, recent field surveys, and conversations with local environmental personnel covering all likely species on Guam and the project areas. Table 5-2 shows the presence of suitable trees within project areas for the Mariana fruit bat, Mariana crow, and Micronesian kingfisher.

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Table 5-1 Presence / Absence of Suitable Habitat and Species within Project Areas

English Common Name	Scientific Name	USFWS Listed/Guam listed ¹	Required Habitat	Presence / Absence of Habitat	Presence / Absence of Species
VEGETATION					
Hayun lagu	<i>Serianthes nelsonii</i>	E / E	Limestone derived soils; on or near steep hillsides	Present	Not Present
Tree fern	<i>Cyathea lunulata</i>	-- / E	Hills of southern Guam, along drainage slopes	Not Present	Not Present
Ufa halomtano	<i>Heritiera longipetiolata</i>	-- / E	Crevices of rough limestone, especially on cliffs	Present	Not Present
--	<i>Tabernaemontana rotensis</i>	-- / S	Limestone forests along cliff line; edge species that now grows along roadsides and disturbed areas	Present	Present
BIRDS					
Guam rail	<i>Rallus owstoni</i>	E / E	Savannas in southern Guam; scrubby secondary growth in northern Guam. Extirpated from Guam; in captive breeding program on mainland U.S.	Present	Not Present
Common moorhen	<i>Gallinula chloropus guami</i>	E / E	Occurs only in wetlands	Not Present	Not Present
Vanikoro swiftlet (Island swiftlet)	<i>Aerodramus vanikorensis bartschi</i>	E / E	Occurs only in caves at south end of Guam	No nesting habitat present Foraging habitat present	Not Present
Micronesian kingfisher	<i>Halcyon cinnamomina cinnamomina</i>	E / E	Native primary growth limestone forest and secondary growth forest to some extent; shrubby habitat of northern Guam. Extirpated from Guam; in captive breeding program on mainland U.S.	Present	Not Present
Mariana crow	<i>Corvus kubaryi</i>	E / E	Mature, native forest, late successional secondary forest	Present	Present
Nightingale reed-warbler	<i>Acrocephalus luscini</i>	E / E	Unique to wetlands.	Not Present	Not Present
Micronesian starling	<i>Aplonis opaca guami</i>	-- / E	No longer known from native forest, but may be present in secondary growth forests	Present	Not Present
Micronesian honeyeater	<i>Myzomela rubrata</i>	-- / E	Uncommon, native resident on Guam; likely extinct	Present	Not Present
MAMMALS					
Mariana fruit bat	<i>Pteropus mariannus mariannus</i>	T / E	Colony east of Pati Point, forages in primary and secondary forest	Present	Present

Table 5-1 Presence / Absence of Suitable Habitat and Species within Project Areas (*continued*)

English Common Name	Scientific Name	USFWS Listed/Guam listed ¹	Required Habitat	Presence / Absence of Habitat	Presence / Absence of Species
REPTILES					
Green sea turtle	<i>Chelonia mydas</i>	T / T	Native resident, rare	Not Present	Not Present
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	E / E	Native resident, rare	Not Present	Not Present
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E / --	Accidental visitor to Guam	Not Present	Not Present
Loggerhead sea turtle	<i>Caretta caretta</i>	T / --	Accidental visitor to Guam	Not Present	Not Present
Oceanic gecko	<i>Gehyra oceanica</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Micronesian gecko	<i>Perocinis ateles</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Pacific slender-toed skink	<i>Nactus pelagicus</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Snake-eyed skink	<i>Cryptoblepharus poecilopleurus</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Tide-pool skink	<i>Emoia atrocasteta</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Azure-tailed skink	<i>Emoia cyanura</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Slevin's skink	<i>Emoia slevini</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present
Moth skink	<i>Lipinia noctua</i>	-- / E	Habitat requirements poorly described, but may use forests from coastal areas to mountainous areas. Most suitable habitat has been eliminated	Present	Not Likely Present

Table 5-1 Presence / Absence of Suitable Habitat and Species within Project Areas (*continued*)

English Common Name	Scientific Name	USFWS Listed/Guam listed ¹	Required Habitat	Presence / Absence of Habitat	Presence / Absence of Species
MOLLUSKS					
-	<i>Allepithema tuberculata</i>	-- / T		Not Present	Not Present
Mt. Alifan tree snail	<i>Partula salifana</i>	-- / E	Closed canopy mesic forest with relatively undisturbed understory	Present	Not Likely Present
Mariana Islands tree snail	<i>Partula gibba</i>	-- / E	Closed canopy mesic forest with relatively undisturbed understory	Present	Not Likely Present
Pacific tree snail	<i>Partula radiolata</i>	-- / T	Closed canopy mesic forest with relatively undisturbed understory	Present	Not Likely Present
Mariana Islands fragile tree snail	<i>Samoana fragilis</i>	-- / E	Closed canopy mesic forest with relatively undisturbed understory	Present	Not Likely Present
INSECTS					
Mariana eight-spot butterfly	<i>Hypolimnys oculata</i> var. <i>mariannensis</i>	-- / E	Karst areas with associative indicator plants (<i>Procris pedunculata</i> , and <i>Elatostema calcareum</i>)	Present	Not Likely Present

¹Listing status: -- = Not listed; E = Endangered; T = Threatened; S = locally sensitive species.

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Table 5-2 Woody Species of Value to Listed Species in Project Areas

Woody Species of Value to Listed Species	Occurrence in Proposed Areas for Clearance	
	ISR/Strike	Commercial Gate
<i>Aglaia mariannensis</i> ^{1,2,3}	X	X
<i>Carica papaya</i> ²		X
<i>Elaeocarpus joga</i> ^{1,2,3}		X
<i>Eugenia reinwardtiana</i> ¹	X	
<i>Eugenia thompsonii</i> ¹	X	
<i>Ficus prolixa</i> ^{1,2,3}	X	
<i>Guamia mariannae</i> ^{1,3}	X	X
<i>Guettarda speciosa</i> ²	X	
<i>Hibiscus tiliaceus</i> ¹	X	X
<i>Intsia bijuga</i> ^{1,3}	X	
<i>Leucaena leucocephala</i> ¹	X	X
<i>Macaranga thompsonii</i> ^{1,2}	X	
<i>Mammea odorata</i> ^{1,2}	X	
<i>Maytenus thompsonii</i> ²	X	
<i>Neisosperma oppositifolia</i> ^{1,2,3}	X	X
<i>Pandanus tectorius</i> ^{1,2,3}	X	X
<i>Pisonia grandis</i> ^{1,2,3}	X	
<i>Premna obtusifolia</i> ^{1,3}	X	X
<i>Tristiropsis obtusangula</i> ¹	X	X
<i>Vitex parviflora</i> ^{1,2}	X	X

¹ Foraging or nesting habitat for Mariana crow

² Foraging or roosting habitat for Mariana fruit bat

³ Nesting habitat for Micronesian kingfisher

Plants

***Heritiera longipetiolata*.** *H. longipetiolata* grows in primary limestone forest, generally in crevices of rough limestone, often on cliffs (Raulerson and Rinehart 1991; Quinata 1994). However, little is known about the ecological relationships of *H. longipetiolata* with pollinators, seed dispersers, or possible herbivores. Quinata (1994) reported the species as rare, but noted a few individuals along the northern edge of the Northwest Field. Occurrences of *H. longipetiolata* have also been noted near cliff line areas in the eastern portion of Northwest Field (Dicke 2006). Areas of Andersen main, particularly karst areas of Pati Point and Tarague Basin, are near the cliff line where *H. longipetiolata* might be expected to occur. *H. longipetiolata* has not been recorded in the ASA from previous surveys.

***Serianthes nelsonii*.** *S. nelsonii* was uncommon on Guam when first reported in the early 1900s (USFWS 1994), and was federally listed in 1987 (USFWS 1987a) without critical habitat. *S. nelsonii* is one of the largest trees in the native forest, growing to over 30 meters in height with a crown diameter of over 20 meters (USFWS 1994). The tree grows along limestone cliffs, generally in primary forest. Fosberg (1960) reported that *S. nelsonii* also occurred in low numbers in late successional secondary forest. There is one mature individual

located between Northwest Field and Ritidian Point in the GNWR overlay (USFWS 1987a). The tree has been surrounded by fencing in an attempt to establish new seedlings (Andersen AFB 2003). Over-browsing on seedlings by deer and pigs and infestation by herbivorous insects caused the decline of this endemic tree (USFWS 1987a). Until recently, this fenced tree was thought to be the last individual, but a second individual was located in the southeastern portion of Northwest Field (Brooke 2005). This second individual has been damaged by typhoons and shows the effects of browsing and rubbing from deer, but has not yet been fenced for protection (Brooke 2005). The tree appears to be supported by an adjacent *Aglaia* tree (Parsons 2006). No *S. nelsonii* individuals have been recorded in the ASA or Commercial Gate area.

***Tabernaemontana rotensis*.** The species *Tabernaemontana rotensis* was thought to be endemic to Guam and the Island of Rota, morphologically distinct from congeneric species elsewhere in the western Pacific, and was formally proposed for endangered status under provisions of the ESA (USFWS 2004a). The monograph (published 1991) synonymizes *T. rotensis* and “several dozen previously recognized species” with a widespread and variable species, *T. pandacacui*. The known range of the *T. pandacacui* extends from southern China to Australia and east from Australia through the Philippines at least as far as the Northern Marianas. Lacking any evidence of declining *T. pandacacui* populations, USFWS now finds no legal basis in ESA provisions to list the taxon found on Guam and Rota (USFWS 2004c). Although the USFWS does not recognize *T. rotensis* as a separate species, it is considered a locally important species and will be considered in this BA. Clusters and individual mature trees and seedlings of *T. rotensis* have been recorded throughout the Base, including the ASA (USFWS 2000; Marler 2006; Parsons 2005). The *T. rotensis* individuals are typically located in primary or late successional secondary growth forests. They can be considered an “edge” species, and are often found in canopy gaps and occasionally along roadsides (USFWS 2000).

Animals

Mariana Fruit Bat (*Pteropus mariannus mariannus*). The Mariana fruit bat was listed as endangered in 1984 (USFWS 1984). By 1995, the Guam population of the Mariana fruit bat was between 300 and 500 individuals (USFWS 2004b). This nocturnal mammal forages across Andersen AFB, Northwest Field, and the MSA (USFWS 2004b). The last known roosting colony is located on Andersen AFB near Pati Point Natural Area. In the past, populations of the Mariana fruit bat on Guam and the Northern Mariana Islands were considered to be separate, and thus listed as endangered and threatened, respectively. A recent change in the status of the Mariana fruit bat on Guam from endangered to threatened reflects the recent classification of the populations on several islands (particularly, Guam and Rota) as a single population, not as an increase in reproductive success on Guam (USFWS 2005a). The bats prefer to roost in large *F. prolixa*, *N. oppositifolia*, and *M. odorata* trees (Wiles 1986). The bats prefer to forage for fruit in *Artocarpus mariannensis*, *Artocarpus altilis* (lemai), *P. dubious*, *C. circinalis*, *M. odorata*, *F. prolixa*, *E. yoga*, *F. tinctoria*, *Erythrina variegata* (gaogao), and *P. tectorius* (Wiles 1986; USAF 2005). Guam currently has fewer than 100 fruit bats (USFWS 2005a; GovGuam DAWR 2005) in the roosting area near the Pati Point, and a recent census of the colony at Pati Point suggests a population of fewer than 30 individuals, with no observations of pups (Lujan 2005). The numbers are declining steadily, probably due, in part, to predation by the BTS on non-volant juveniles (*i.e.*, too old to be carried by an adult,

and too young to fly) (Wiles, *et al.* 1995) and low frequency but chronic poaching (Brooke 2005; USFWS 2005c; Wiles 1994).

Mariana Crow (*Corvus kubaryi*). The Mariana crow was listed as endangered in 1984 (USFWS 1984), and only a few remaining Mariana crows occur on the northern end of Guam and the Island of Rota. Many of the less than 15 birds remaining on Guam were transplanted from Rota, and all are reported to be at or near Andersen AFB (USFWS 2004b; GovGuam DAWR 2005). The Mariana crow seems to have a preference for native trees of large stature, nesting most frequently in emergent *F. prolixa* and *E. yoga* trees (Morton 1996; Lujan 1996), although there is some evidence the crow will nest in late successional secondary growth forest, including *Guamia mariannae* (paipai) and *Premna obtusifolia* (ahgao) (USAF 2005). The crows are omnivorous, and will forage in a number of trees, including *Artocarpus mariannensis*, *C. nucifera*, *F. prolixa*, *P. dubious*, *C. equisetifolia*, and *N. oppositifolia* (Tomback 1986; USFWS 1990a; USFWS 2005b). The crows are sensitive to human disturbance, and prefer to nest in trees greater than 290 meters from roadways (Morton 1996; USFWS 2004b), although there has been evidence of nesting attempts approximately 10 meters from a road and another nest approximately 30 meters from a road (Lujan 2005). In addition, crows have reportedly nested in the MSA 1, where blocks of forest are approximately 110 meters wide (Lujan 2005). Population declines of the Mariana crow are primarily the result of habitat loss and predation by the BTS (Savidge 1987; Wiles, *et al.* 2003; GovGuam DAWR 2005). Andersen AFB contains tracts of native limestone forest, some of which could be considered relatively intact (*e.g.*, the forested areas proposed for critical habitat, including Northwest Field, the MSA and Andersen main). The higher quality tracts are considered essential to recovery of the Mariana crow, while tracts at lower states of succession have potential for habitat restoration efforts (USFWS 2004c).

Micronesian Kingfisher (*Halcyon cinnamomina cinnamomina*). The Micronesian kingfisher was listed as endangered in 1984 (USFWS 1984). It has been wholly extirpated in the wild due to habitat loss and predation by the BTS (Savidge 1987; Wiles, *et al.*, 2003), and persists in zoos in captive lineages (GovGuam DAWR 2005) and at a captive breeding facility on Guam run by DAWR. The Micronesian kingfisher nests and feeds primarily in mature limestone forests and late successional secondary growth forests, and occasionally in *Cocos nucifera* (coconut) plantations. The Micronesian kingfisher feeds entirely on animal matter, and is a deliberate forager (USFWS 1990a; USFWS 2004d). The general foraging habit is to perch motionless on large trees with exposed branches and survey the ground below. Nesting behavior includes excavation of nesting cavities from large trees with “soft” or partially “rotten” wood, typical of native limestone forest. Their preferred nesting tree is the *P. grandis* (GovGuam DAWR 2005), but they will also utilize *Artocarpus mariannensis*, *C. nucifera*, and *F. prolixa* if available (USFWS 1990a).

Guam Rail (*Rallus owstoni*). The Guam rail is a flightless, omnivorous, ground-nesting bird. Although omnivorous, the Guam rail prefers animal matter over vegetable matter (*e.g.*, lizards, gastropods, and carrion). The Guam rail generally lives in brushy areas mixed with grassland or forest (USFWS 1990a). The Guam rail was listed in 1984 as endangered in its entire range (USFWS 1984). It has been wholly extirpated in the wild due to predation from the BTS, and persists as captive lineages in zoos (GovGuam DAWR 2005; Wiles *et al.* 1995) and at a captive breeding facility on Guam run by DAWR. In Rota, where BTSs are not

present, habitat was designated for release of Guam rails. This population considered an experimental, non-essential population (USFWS 1989), and was proposed to be used for future “wild” introductions to Guam. On Guam, an area of Andersen AFB known as Area 50 (part of the GNWR overlay) was fenced to exclude BTSs, and extensive trapping of BTSs has occurred. In 1988, 16 Guam rails were released into Area 50; at least four of the birds died, but four breeding pairs hatched 10 chicks. In 2000, the Guam DAWR initiated playback surveys which detected 10 Guam rails within Area 50 (GovGuam DAWR 2000c). Although fencing is preventing predation by BTSs, feral cats are still able to enter the area and prey on juvenile and adult rails (GovGuam DAWR 1999). Conservation personnel indicate that no rails are currently present in Area 50 (Lujan 2005).

Three snail species, Pacific tree snail (*Partula radiolata*), Mariana Islands tree snail (*Partula gibba*), and Mariana Islands fragile tree snail (*Samoana fragilis*). In 1995 these species were restricted to several small areas in northern Guam (Wiles, *et al.* 1995). There are no records of these species occurring in the ASA, primarily due to removal of suitable habitat (USAF 2000; Andersen AFB 2003; Wiles *et al.* 1995). Vegetation commonly associated with the tree snails include *P. tectorius*, *P. dubious*, *G. mariannae*, *H. tiliaceus*, *Flagellaria indica* (beyuko halomtano’), and *P. suberosa*. The snails prefer moist closed canopy forested areas with minimal ground level disturbance. The primary reasons for decline of the three snail species are predation by the invasive Giant African snail (*Achatina fulica*) and the invasive Black flatworm (*Platydemus manokwari*) (Hopper and Smith 1992).

Mariana eight-spot butterfly (*Hyploymnus octicula mariannensis*). This is a federal candidate for T&E listing (USFWS 2002). The larvae of this species feed on two native plants, *Procris pedunculata*, and *Elatostema calcareum*. These forest fleshy herbs only grow on karst limestone, and the plant species have declined due to browse pressure by Philippine deer. The two herbaceous species might be expected to occur in karst surface areas within the ASA. Additionally, decline of the Marianas eight-spot butterfly can be attributed to predation of eggs and larvae by non-native wasps and ants (USFWS 2002).

Brown tree snake (*Boiga irregularis*). The BTS was introduced to Guam, probably as a passive stowaway in a military cargo ship moving material after world war II. The snake’s historic range includes portions of Indonesia, New Guinea, the Solomon Islands, and Australia (Rodda, *et al.* 1999). Upon arrival in Guam, the BTS encountered an abundant prey base and an absence of natural predators and pathogens. The populations of native forest birds have declined on Guam because of the BTS (Savidge 1987) and loss of habitat from expanding agriculture and urban development (GovGuam DAWR 2005). The BTS is directly responsible for extinction or local extirpation of 11 of 18 native bird species throughout Guam, and five native birds (of 18) have experienced population declines greater than 90 percent and are not recovering (Wiles, *et al.* 2003). In addition to native birds, three of 12 native lizards on Guam have been extirpated by the BTS, and native bat species have been heavily impacted by the BTS (Wiles, *et al.* 2003; Wiles, *et al.* 1995; GovGuam DAWR 2005). BTSs do not tend to occur in open grassy areas, but will cross unpaved roads and may occur in sparsely forested areas (Tobin *et al.* 1999). The snake is a nocturnal species commonly found in trees, caves, and near limestone cliffs, but may move to the ground to forage during the night.

Philippine deer (*Cervus mariannus*). Philippine deer were brought to Guam approximately 200 years ago from the Philippines, and rapidly spread throughout Guam. The

deer typically live in forested areas and browse woody species and grasses. They appear to preferentially browse native woody species over non-native species. Population surveys of deer taken in 2000-2001 in the MSA revealed approximately 920 individuals, or 1.83 deer per hectare (Knutson and Vogt 2002), indicating some of the highest deer densities anywhere in the world. Further, these surveys suggest that individuals within the deer population are in generally good health, as determined by females breeding before 1 year of age (Shea, as cited in Knutson and Vogt 2002). Therefore, due to the general health of the population, this suggests that the local carrying capacity has not yet been reached, and there are adequate resources to sustain deer on Guam, and they are a regulated game species.

Feral pigs (*Sus scrofa*). Domestic pigs were brought to Guam by the Spanish in the late 1600s, escaped, and established breeding populations. They now occur throughout Guam. Pigs, which can eat almost anything, use their noses to root around in the forest floor searching for fallen fruits, young plants, coconuts, and animals such as worms and snails. They cause considerable damage by feeding on crops such as watermelon and taro. They also build and use wallows, which are pits that trap water when it rains. Like deer, pigs have adequate resources to support their population, and maintain very high densities. Population surveys of pigs taken in 2000-2001 in the MSA and Andersen AFB indicated a pig population of approximately 186 individuals, or 0.38 pigs per hectare (Knutson and Vogt 2002). Pigs are also a regulated game species.

5.3 JANUARY 2006 SURVEYS

Several additional surveys to determine the presence or absence of habitat for several T&E species and the relative habitat quality within the ASA were conducted within the area of the proposed action (Parsons 2006). The following surveys were conducted January 9-22, 2006, and included:

- Vegetation survey;
- Ungulate census;
- Presence / absence of the Mariana crow;
- Presence / absence of the Mariana fruit bat;
- Presence / absence of *S. nelsonii* in proposed cleared areas;
- Presence / absence of candidate snails;
- Presence /absence of Mariana eight-spot butterfly; and
- Incidental observations of other listed species, including *T. rotensis* and *H. longipetiolata*.

5.3.1 Vegetation Surveys

Methods

Woody vegetation sampling within the 124.4-hectare ASA was accomplished with circular quadrant sampling methods derived from James and Schugart (1970). This method of woody species sampling has been employed on previous environmental studies at Andersen AFB (Parsons 2005, USAF 2000). Survey plot density was one plot per 2 hectares. Each plot was a

circle, with a total sampling area of 100 square meters. The plots were randomly located using random number generators, and were restricted to be at least 20 meters apart. Fifty-nine plots within the ASA were surveyed. Some proposed facilities for the ASA will be constructed on previously developed land, therefore, not surveyed. Pedestrian surveys were conducted within the Commercial Gate areas (3.5 hectares). Figure 5-1 shows the vegetation survey locations relative to the proposed project areas.

Plot locations were located using a global positioning system (GPS). String was used in densely vegetated plots to segment the plot area into manageable inventory components. All trees with a diameter at breast height (DBH; 1.3 meters from the ground) of 2.5 centimeters within each plot were counted and the species name recorded. Sizes were measured with calipers for small-diameter stems, or with hand-held diameter tapes for larger diameter stems (trunks). A plant species list with frequency of species occurrence was compiled for each plot.

Because sampling only occurred inside proposed cleared areas, vegetation communities outside proposed cleared areas were delineated using recent high resolution multi-spectral imagery acquired by the QuickBird Satellite (DigitalGlobe: 2.6-meter resolution and Panchromatic imagery: 0.6-meter resolution). After the plots were sampled, the known vegetation communities were compared to the imagery to obtain a contiguous vegetation cover.

Results

Vegetation surveys conducted in January 2006 provided vegetation community type descriptions within the ASA and Commercial Gate areas (Parsons 2006). These vegetation community types are associated with secondary growth limestone forests, as well as an herbaceous dominant vegetation community. Vegetation community types observed are at a successional state resulting from a variety of past perturbations, as well as the continued presence of browse pressure from ungulates. Woody species are still subject to natural perturbations, namely typhoons, as evidenced by the many blow-downs of trees that have rooted on shallow soil and partial defoliation in the canopy.

Three vegetation communities are present within the proposed project areas at Andersen Main, including the secondary woody limestone forest community, the secondary shrubby limestone community, and an herbaceous shrub community (Fosberg 1960). Although vegetation communities may be divided into any number of types or sub-categories, the following are the most representative of the area. Therefore, the secondary woody limestone forest was further classified into the following vegetation community types (named by the dominant plant species): *Aglaia* – *Guamia* forest, *Guamia* forest, *Neisosperma* – *Macaranga* forest, *Guamia* – *Premna* forest, and *Vitex* – *Elaeocarpus* forest (derived from Donnegan, *et al.* 2004; Lujan 2005). The secondary shrubby limestone community is classified as *Hibiscus*–*Leucaena* shrub. For the purposes of this BA, the herbaceous community was not classified further into community types.

Table 5-3 lists the proposed clearance activities relative to the amount of the vegetation community types removed and identifies woody and sapling species found within those community types. Table 5-4 summarizes the plot data relative to vegetation community types. Vegetation community types relative to the ASA are shown Figure 5-2. Figure 5-3 is map of vegetation community types within the Commercial Gate project area.

Mapped vegetation communities outside of sampled areas were obtained by comparing the known vegetation communities to high resolution multi spectral imagery acquired by the QuickBird satellite (DigitalGlobe imagery: 2.6-meter resolution; Panchromatic imagery: 0.6-meter resolution).

Table 5-3 Vegetation Community Types and Clearance Activities (in hectares)

Vegetation Community Type	Woody Species Observed Within Plots	Woody Sapling Species Observed Within Plots	Total Area Subject to Clearance	Total Area Cleared as Percentage of Refuge Overlay and Ritidian Unit ¹
Aglaia – Guamia Forest	<i>Aglaia mariannensis</i> <i>Guamia mariannae</i> <i>Cycas circinalis</i> <i>Ficus prolixa</i> <i>Hibiscus tiliaceus</i> <i>Eugenia thompsonii</i> <i>Morinda citrifolia</i> <i>Neisosperma oppositifolia</i> <i>Maytenus thompsonii</i> <i>Mammea odorata</i> <i>Tabernaemontana rotensis</i>	<i>Aglaia mariannensis</i> <i>Caesalpinia major</i> <i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Ixora coccinea</i> <i>Neisosperma oppositifolia</i> <i>Pandanus tectorius</i> <i>Triphasia trifolia</i>	20.5	0.5
Guamia Forest	<i>Guamia mariannae</i> <i>Aglaia mariannensis</i> <i>Hibiscus tiliaceus</i> <i>Cycas circinalis</i> <i>Neisosperma oppositifolia</i> <i>Psychotria mariana</i>	<i>Aglaia mariannensis</i> <i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Neisosperma oppositifolia</i> <i>Pandanus tectorius</i> <i>Triphasia trifolia</i>	17.6	0.4
Herbaceous Scrub	<i>Morinda citrifolia</i> <i>Pandanus tectorius</i> <i>Hibiscus tiliaceus</i> <i>Triphasia trifolia</i>	<i>Morinda citrifolia</i> <i>Pandanus tectorius</i> <i>Hibiscus tiliaceus</i> <i>Triphasia trifolia</i>	16.4	0.4
Neisosperma – Macaranga Forest	<i>Guamia mariannae</i> <i>Macaranga thompsonii</i> <i>Neisosperma oppositifolia</i> <i>Aglaia mariannensis</i> <i>Hibiscus tiliaceus</i> <i>Eugenia thompsonii</i> <i>Cycas circinalis</i> <i>Ficus prolixa</i> <i>Premna obtusifolia</i> <i>Morinda citrifolia</i> <i>Intsia bijuga</i> <i>Psychotria mariana</i> <i>Maytenus thompsonii</i> <i>Mammea odorata</i> <i>Pandanus tectorius</i>	<i>Aglaia mariannensis</i> <i>Flagellaria indica.</i> <i>Eugenia thompsonii</i> <i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Leucaena leucocephala</i> <i>Macaranga thompsonii</i> <i>Neisosperma oppositifolia</i> <i>Pandanus fragrans</i> <i>Pandanus tectorius</i> <i>Premna obtusifolia</i> <i>Tabernaemontana rotensis</i> <i>Triphasia trifolia</i>	1.4	< 0.1

**Table 5-3 Vegetation Community Types and Clearance Activities (in hectares)
(continued)**

Vegetation Community Type	Woody Species Observed Within Plots	Woody Sapling Species Observed Within Plots	Total Area Subject to Clearance	Total Area Cleared as Percentage of Refuge Overlay and Ritidian Unit ¹
Hibiscus – Leucaena Shrub	<i>Hibiscus tiliaceus</i> <i>Leucaena leucocephala</i> <i>Pandanus tectorius</i> <i>Aglaia mariannensis</i> <i>Cycas circinalis</i>	<i>Aglaia mariannensis</i> <i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Leucaena leucocephala</i> <i>Morinda citrifolia</i> <i>Pandanus tectorius</i> <i>Triphasia trifolia</i>	7.2	0.2
Guamia – Premna Forest	<i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Aglaia mariannensis</i> <i>Premna obtusifolia</i> <i>Neisosperma oppositifolia</i> <i>Cycas circinalis</i> <i>Ficus prolixa</i> <i>Macaranga thompsonii</i> <i>Maytenus thompsonii</i> <i>Eugenia thompsonii</i> <i>Pandanus tectorius</i> <i>Triphasia trifolia</i>	<i>Aglaia mariannensis</i> <i>Cycas circinalis</i> <i>Eugenia thompsonii</i> <i>Guamia mariannae</i> <i>Hibiscus tiliaceus</i> <i>Leucaena leucocephala</i> <i>Pandanus tectorius</i> <i>Premna obtusifolia</i> <i>Tabernaemontana rotensis</i> <i>Triphasia trifolia</i>	9.0	0.2
Vitex – Remnant <i>Elaeocarpus</i> Forest	<i>Guamia mariannae</i> <i>Vitex parviflora</i> <i>Cycas circinalis</i> <i>Neisosperma oppositifolia</i> <i>Premna obtusifolia</i> <i>Pandanus tectorius</i>	<i>Aglaia mariannensis</i> <i>Elaeocarpus joga</i> <i>Guamia mariannae</i> <i>Neisosperma oppositifolia</i> <i>Pandanus tectorius</i> <i>Triphasia trifolia</i> <i>Vitex parviflora</i>	1.8	< 0.1
TOTAL			73.9	1.7

Total area cleared as a percentage is calculated as: The total area subject to clearance divided by the total refuge overlay and Ritidian Unit. The Refuge overlay and Ritidian Unit is 4,480. For example, in the Aglaia-Guamia forest, $(20.5 / 4,480) * 100 = 0.5 \%$.

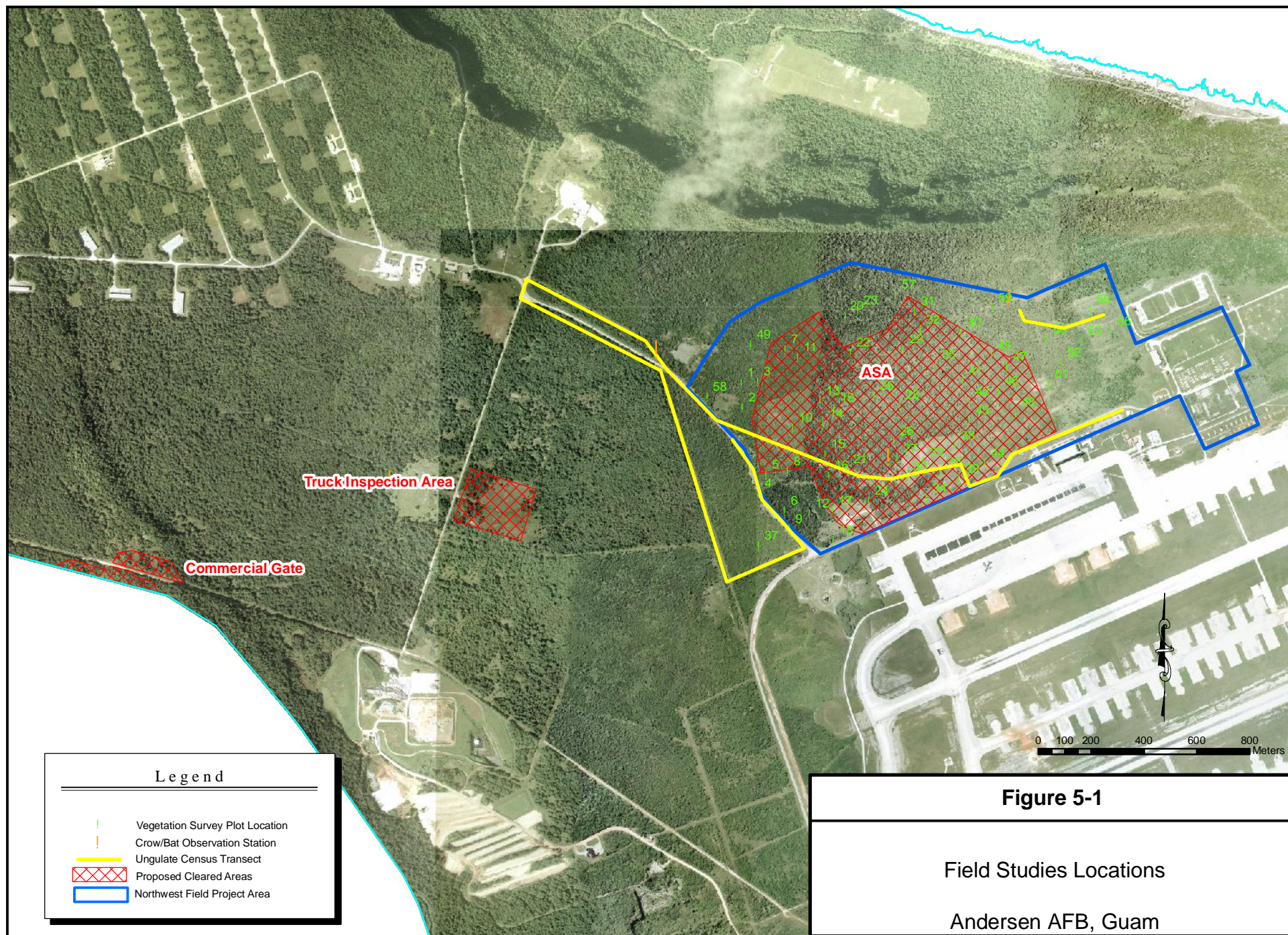
Table 5-4 Plot and Vegetation Community Type

Plot Number	Vegetation Community Type	Species Richness¹	Number of Woody Species Sampled
ISR-001	<i>Guamia</i> Forest	5	25
ISR-002	<i>Guamia</i> - <i>Premna</i> Forest	5	36
ISR-003	<i>Guamia</i> Forest	4	20
ISR-004	<i>Neisosperma</i> - <i>Macaranga</i> Forest	5	46
ISR-005	<i>Neisosperma</i> - <i>Macaranga</i> Forest	7	27
ISR-006	<i>Neisosperma</i> - <i>Macaranga</i> Forest	5	80
ISR-007	<i>Aglaia</i> - <i>Guamia</i> Forest	2	14
ISR-008	<i>Aglaia</i> - <i>Guamia</i> Forest	4	24
ISR-009	<i>Neisosperma</i> - <i>Macaranga</i> Forest	8	34
ISR-010	<i>Guamia</i> Forest	3	18
ISR-011	<i>Aglaia</i> - <i>Guamia</i> Forest	4	20
ISR-012	<i>Neisosperma</i> - <i>Macaranga</i> Forest	8	44
ISR-013	<i>Guamia</i> Forest	4	40
ISR-014	<i>Guamia</i> Forest	3	24
ISR-015	<i>Aglaia</i> - <i>Guamia</i> Forest	4	39
ISR-016	<i>Aglaia</i> - <i>Guamia</i> Forest	6	42
ISR-017	<i>Aglaia</i> - <i>Guamia</i> Forest	3	8
ISR-018	Herbaceous Scrub	0	0
ISR-019	<i>Guamia</i> Forest	2	14
ISR-020	<i>Neisosperma</i> - <i>Macaranga</i> Forest	6	32
ISR-021	Herbaceous Scrub	2	4
ISR-022	<i>Aglaia</i> – <i>Guamia</i> Forest	6	17
ISR-023	<i>Neisosperma</i> - <i>Macaranga</i> Forest	5	27
ISR-024	<i>Aglaia</i> – <i>Guamia</i> Forest	3	20
ISR-025	<i>Guamia</i> Forest	2	36
ISR-026	<i>Guamia</i> Forest	1	32
ISR-027	Hibiscus – <i>Leucaena</i> Shrub	3	38
ISR-028	<i>Guamia</i> Forest	3	27

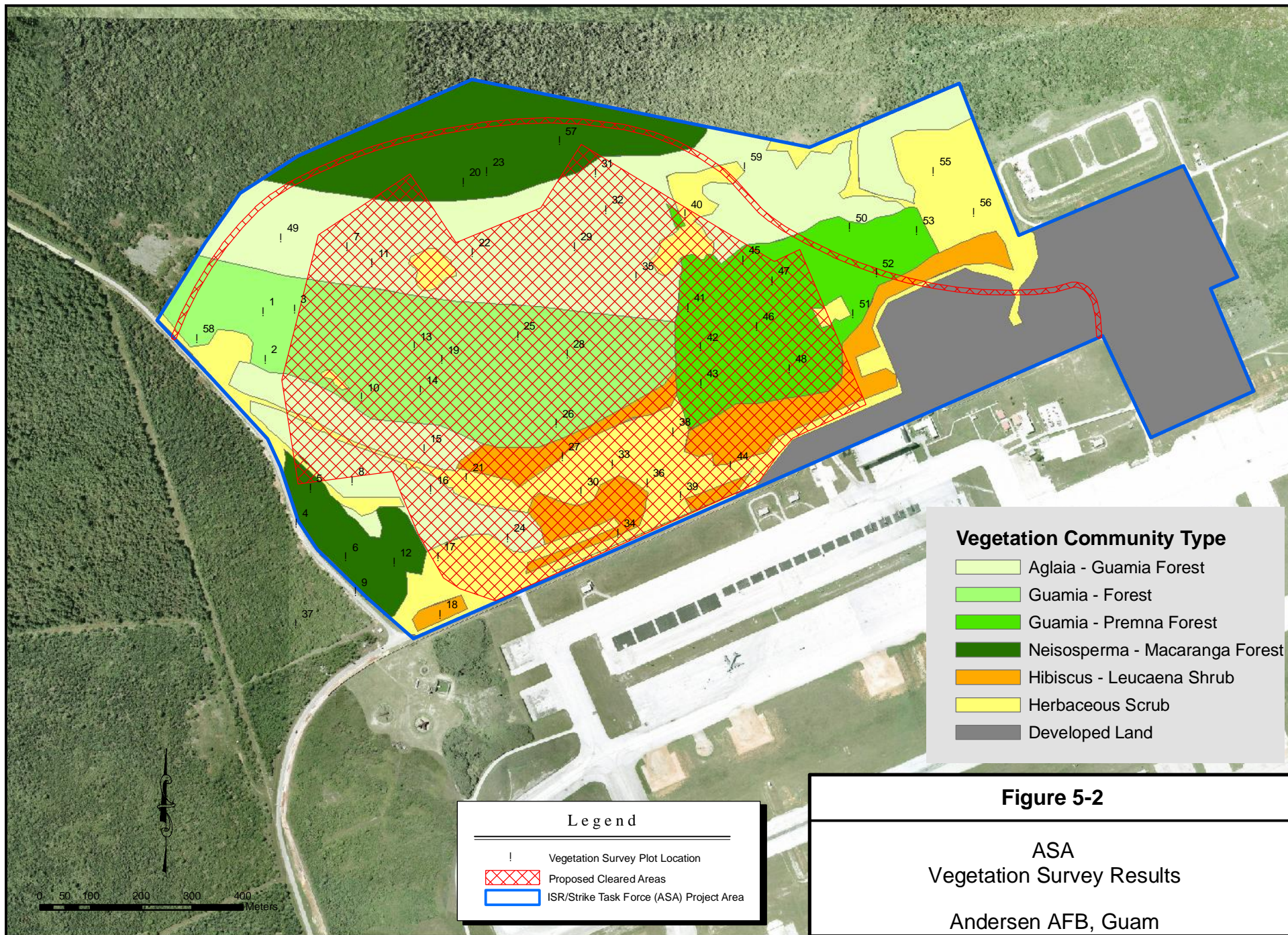
Table 5-4 Plot and Vegetation Community Type (continued)

Plot Number	Vegetation Community Type	Species Richness ¹	Number of Woody Species Sampled
ISR-029	<i>Aglaia</i> - <i>Guamia</i> Forest	3	27
ISR-030	Herbaceous Scrub	1	1
ISR-031	<i>Aglaia</i> - <i>Guamia</i> Forest	3	8
ISR-032	<i>Aglaia</i> - <i>Guamia</i> Forest	5	11
ISR-033	Herbaceous Scrub	0	0
ISR-034	Hibiscus – <i>Leucaena</i> Shrub	2	15
ISR-035	<i>Aglaia</i> - <i>Guamia</i> Forest	2	12
ISR-036	Herbaceous Scrub	0	0
ISR-037	<i>Guamia</i> Forest	4	18
ISR-038	Herbaceous Scrub	0	0
ISR-039	Herbaceous Scrub	0	0
ISR-040	<i>Guamia</i> Forest	3	27
ISR-041	<i>Guamia</i> - <i>Premna</i> Forest	3	21
ISR-042	<i>Guamia</i> - <i>Premna</i> Forest	3	8
ISR-043	<i>Guamia</i> - <i>Premna</i> Forest	5	25
ISR-045	<i>Guamia</i> - <i>Premna</i> Forest	3	8
ISR-046	<i>Guamia</i> - <i>Premna</i> Forest	4	13
ISR-047	<i>Guamia</i> - <i>Premna</i> Forest	3	12
ISR-048	<i>Guamia</i> - <i>Premna</i> Forest	4	47
ISR-049	<i>Aglaia</i> - <i>Guamia</i> Forest	5	12
ISR-050	<i>Guamia</i> - <i>Premna</i> Forest	5	22
ISR-051	Herbaceous Scrub	0	0
ISR-052	<i>Guamia</i> - <i>Premna</i> Forest	3	7
ISR-053	<i>Guamia</i> - <i>Premna</i> Forest	3	24
ISR-054	Herbaceous Scrub	0	0
ISR-056	Herbaceous Scrub	0	0
ISR -057	<i>Neisosperma</i> - <i>Macaranga</i> Forest	7	20
ISR-058	Developed	0	0
ISR-059	Herbaceous Scrub	0	0

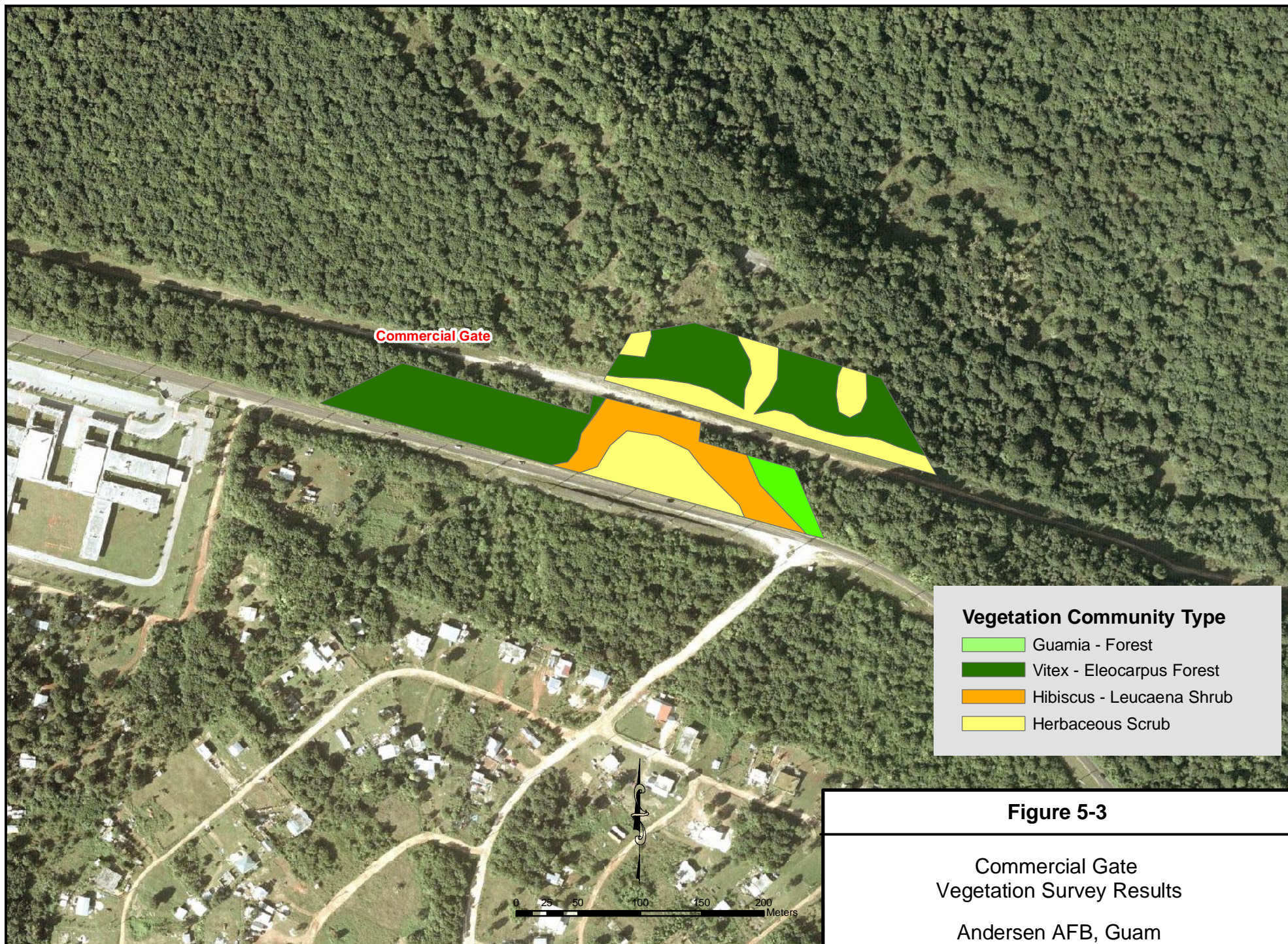
¹ Species richness is the number of species represented within each plot. For the purposes of this Biological Assessment, species richness is only measured for tree species greater than 2.5 cm in diameter measured at breast height (1.37-meters above the ground surface)



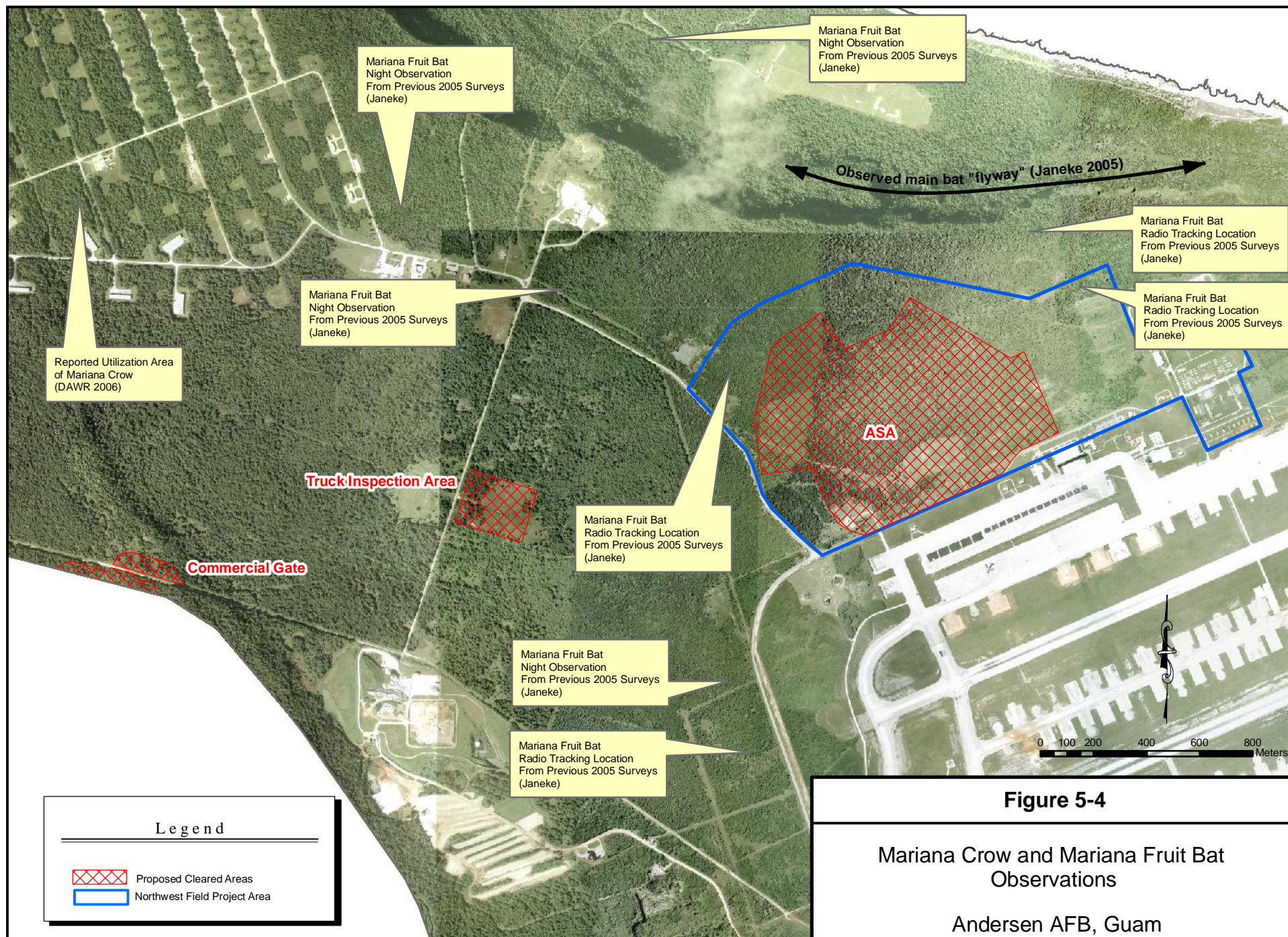
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5.3.2 Ungulate Census

Methods

Occurrences of ungulate damage were recorded within vegetation plots, including scat, wallows, trails, browse on vegetation, and bark rubs. These features were also noted during travel between plots, as were actual observations of deer and pigs.

In addition to recording evidence of ungulate impacts during day time vegetation surveys, three nighttime spotlight deer surveys were conducted throughout the project area. Spotlight surveys are not designed to count a total deer population; but the number of deer within a representative portion of habitat. A total estimate of the deer population is made by extrapolating the number of deer per visible area to the total project area. The density estimate consists of the number of deer counted divided by the total visible area. Spotlight census methods were adapted from Jester and Dillard (2002) and Shult and Armstrong (2002). The spotlight survey crew consisted of a vehicle driver and two counters. Each counter was responsible for observation on one side of the vehicle to increase the accuracy of deer counts. The vehicle speed never exceeded 6 km/hour. Location of the deer spotlight census route relative to the project area is shown in Figure 5-1.

The spotlight census survey involved three steps:

Spotlight census line establishment. Spotlight transect lines were established prior to the first nighttime survey. Lines were established based on road placement, visibility, habitat variability, and coverage of the project area.

Calculation of visible area. Visibility distance measurements (D_v) were recorded on the left and right side of the vehicle every 160 meters along the transect line and perpendicular to the vehicle path. Distance measurements were taken with a laser rangefinder. These distances formed the boundary of the visible area. Measurements were taken at the start and end points of the census line. The formula for calculating the visible area follows:

- $(D_v / (P + 1)) + (L \times 1,760 / 4,840) = \text{Acres of Visibility}$
- $(\text{Acres of Visibility}) / 247.1 \text{ Acres per square km} = \text{SQKM of Visibility}$
- Where:
 - ❖ D_v = Distance in visible yards, perpendicular to the vehicle transect
 - ❖ P = Number of 0.1-mile points along the vehicle transect
 - ❖ L = Length in miles of the vehicle transect

Spotlight Survey. Two observers counted deer on either side of the vehicle. The vehicle speed did not exceed 8 kilometers per hour. Surveyors used one 1,000,000-candlepower battery-powered spotlight. Deer are usually spotted by their greenish-white reflective eyes, and binoculars were used to enhance observations. Deer over 230 meters from the vehicle were not recorded.

Results

A spotlight census from the January 2006 surveying suggests a deer density in the ASA of 122 deer/square kilometer. Deer locations varied by vegetation community type. Most deer seen at night were observed in relatively open herbaceous scrub.

Previous surveys suggest a Philippine deer density of 183 deer/square kilometer within the MSA (Knutson and Vogt 2002). Drive counts, which use different methods than a spotlight census, were used within the MSA (Knutson and Vogt 2002) for the population census and density measurements. Vegetation communities in the MSA and ASA are different in composition and structure; therefore, density numbers would not be expected to be uniformly distributed. Lower densities are expected in ASA when compared to the MSA because the MSA offers deer more protective screening and more browse availability than portions of the ASA.

Previous spotlight surveys conducted in Northwest Field (Parsons 2005) resulted in low deer counts, and are generally not accepted as accurate measurements of deer density in Northwest Field. Differences in hunting pressure may have negatively biased density estimates at Northwest Field, where access for poachers is easier than in the ASA or MSA (Brooke 2005). In addition, deer in Northwest Field would be expected to be more wary of vehicles and perhaps extremely wary of spotlights, which are often used during night-time poaching (Parsons 2005). Deer signs, such as scat, bedding, and antler rubs on trees, appear to be uniform in Northwest Field and the ASA. Therefore, the variable density measurements within the ASA, MSA, and Northwest Field project area suggest that hunting pressure and access should be considered as negatively skewing density measurements in public hunting areas that allow hunting with firearms and which could be subject to poaching. Further, deer populations within the ASA, MSA, and Northwest Field are not isolated, and seasonal browse availability may influence movement into different areas.

Feral pigs were observed during nighttime surveys, as well as during daytime vegetation surveys. Six pigs were observed during spotlight counts in the January 2006 survey, which suggests a density of 21.4 pigs/square kilometer. Previous surveys within the MSA suggest a density of 32 pigs/square project areas (Knutson and Vogt 2002).

5.3.3 Presence/Absence of the Mariana Fruit Bat

Methods

Observations of Mariana fruit bats were recorded by three surveyors. Three point count stations were established along the perimeter and within the project areas, as shown in Figure 5-1. Four morning surveys and four evening surveys were scheduled in January 2006; however, morning downpours caused three morning surveys to be cancelled, placing an emphasis on the evening surveys. Six evening and one morning surveys were accomplished in suitable weather conditions acceptable for observation (Bibby, *et al.* 1992; Amidon 2005). Nighttime surveys were aided by night vision technology, which exaggerated subtle light differences through a monocular lens. Elevated seat-mounted tripods were erected at two survey locations. Surveyor eye height while seated was approximately 5.4 meters; greater height was accomplished by placing the tripods on elevated areas. Survey stations were occupied for 3 hours at a time. Morning surveys began at 05:15, or 30 minutes prior to sunrise, and lasted until 07:15. Evening surveys began at 17:20, or 30 minutes prior to sunset, and lasted until 20:20. Surveyors used binoculars and recorded observations of Mariana fruit bats (and/or Mariana crows) on data forms.

Mariana fruit bat detections were marked on a field map along with an arrow indicating flight direction and duration. Data forms included the following items:

- Start / end time;
- Weather conditions;
- Distance and bearing of observation;
- Direction of travel and duration of flight;
- Map location, indicating direction;
- Canopy vegetation associated with observation; and
- Incidental observation of other listed species.

Observations of Mariana fruit bats were recorded by three surveyors in conjunction with the Mariana crow observations. Methods for Mariana fruit bat surveys are identical to the methods used for Mariana crow surveys (Subchapter 5.3.4). In addition to morning and evening surveys, associative trees of the Mariana fruit bat were noted within vegetation plot surveys, including *E. joga*, *F. tinctoria*, *E. variegata*, *N. oppositifolia*, and *P. tectorius*.

Results

No Mariana fruit bats were observed within the ASA and Commercial Gate project area during the January surveys. Accounts of previous observations of Mariana fruit bats were provided by USFWS personnel (Brooke 2005). Based on these observations, one Mariana fruit bat was observed within the ASA. Figure 5-4 shows locations of Mariana fruit bat observations relative to the ASA and Commercial Gate project area. Recent observations were obtained from DAWR (Brooke 2005).

Although highly degraded from ungulate pressure, prior land use, and presence of the BTS, useable habitat for the Mariana fruit bat is present within the ASA and Commercial Gate project area (Wiles, *et al.* 1995). This potential habitat occupies 57.5 hectares, primarily within the forest community types that contain suitable associative tree species, especially in areas overlying rocky and karst substrates that have been spared from past land clearance activities. Of the 57.5 hectares identified as potential habitat for the Mariana fruit bat, 1.4 hectares can be considered higher quality, based on the canopy structure for roosting and species composition for foraging. With the main colony of Mariana fruit bats at Pati Point, it is probable that Mariana fruit bats would forage in suitable tree species found within the ASA.

5.3.4 Presence/Absence of the Mariana Crow

Methods

Observations of Mariana crows were recorded by three surveyors in conjunction with the Mariana fruit bat observations. Methods for Mariana crow surveys are identical to the methods used for Mariana fruit bat (Subchapter 5.3.4). In addition to morning and night surveys, associative trees of the Mariana crow were noted within vegetation plot surveys, including *E. joga*, *N. oppositifolia*, and *P. tectorius*.

Results

Ten juvenile crows were released by DAWR in November in the MSA (Dicke 2005). A crow was reported by a hunter on November 27, 2005 within Andersen main, south of Northwest Field (Brooke 2005). Figure 5-4 shows locations of Mariana crow observations relative to the ASA and Commercial Gate project area. Recent data obtained from DAWR (Dicke 2006) indicate nesting and utilization areas occur mostly within the MSA, in eastern portions of Northwest Field, and at Pati Point.

Although highly degraded from ungulate pressure, prior land use, and presence of the BTS, habitat for the Mariana crow is present within the ASA and Commercial Gate project area (Lujan 1996; Savidge 1987; Wiles, *et al.* 1995; Lujan 2005). This potential habitat occupies 57.5 hectares, primarily within the forest community types that contain suitable associative tree species, especially in areas overlying rocky and karst substrates that have been spared from past land clearance activities. Of the 57.5 hectares of potential habitat, 1.4 hectares can be considered more suited to the Mariana crow due to species composition and structure. Lujan (1996) recorded crow nests in *F. prolixa* trees in the general area of the ASA.

5.3.5 Presence/Absence of the *S. nelsonii*

Methods

S. nelsonii is one of the largest native trees in the Mariana Islands. Historically, trees were found with heights of up to 36 meters and trunks of up to 2 meters in diameter. Surveys for this tree were conducted within the proposed cleared areas and within vegetation survey plots. Methods for *S. nelsonii* presence/absence correspond to vegetation survey methods described in Subchapter 5.4.

Results

There are six known mature *S. nelsonii* individuals, none of which are near the ASA or Commercial Gate project area. Of these six individuals, two are in the eastern portions of the Northwest Field, and four are in the Tarague Basin area. No additional *S. nelsonii* individuals were observed during the surveys. Habitat for *S. nelsonii* is highly degraded in the ASA and Commercial Gate area, primarily due to habitat removal and ungulate pressure.

5.3.6 Presence/Absence of Candidate Snails

Methods

To determine if three candidate snails were present, the survey included observations under leaf litter and under surface rocks. These snails include the Pacific tree snail (*Partula radiolata*), Humped tree snail (*Partula gibba*), and Fragile tree snail (*Samoana fragilis*). Vegetation survey plots were evaluated as potential snail habitat. Most survey plots were characterized by xeric understory with a relatively or completely open canopy. These conditions are not suitable for the candidate snails; therefore, only mesic plots were surveyed for snail presence.

Leaf litter and surface rocks were examined for signs of snails, including fecal traces, shells, and actual individuals. Observations of the two known predators on the three candidate snails were noted.

The following data were recorded on data forms, including:

- Time of observation;
- Weather conditions;
- Numbers of individuals;
- Canopy closure;
- Associated plant species; and
- Observable impacts.

Results

None of the three candidate snails were observed within the ASA or Commercial Gate project area. Presence of the African tree snail, a known predator of the candidate snails, was observed in the project areas.

Habitat for the three candidate snails exists in mesic, relatively closed-canopy forest, where ground disturbance has been minimal or absent (Hopper and Smith 1992). Most potential snail habitat at Andersen main has been degraded as a result of prior land use and disturbance. Marginal habitat, however, appears to be present in a narrow band of intact secondary limestone forest near the cliff line in the northern portion of the ASA, as well as in a pocket of intact secondary forest on a karst substrate in the southwest portion of the ASA. This habitat occupies 6.5 hectares of the ASA. No habitat is present within the Commercial Gate project area.

5.3.7 Presence/Absence of Mariana Eight-spot Butterfly Indicator Plants

Methods

Karst limestone, which is suitable for the presence of the two herbaceous indicator species for the Mariana eight-spot butterfly, occurs within 1 kilometer of the project area. Therefore, it was prudent to identify those herbaceous species. Methods associated with vegetation survey plots were used to identify potential occurrences of the indicator plants.

Results

No observations of the Mariana eight-spot butterfly occurred during surveys within the ASA or Commercial Gate project area. In addition, the associative plants *Procris pedunculata* and *Elatostema calcareum*, were not observed during surveys. One butterfly species *Euploea eunice hobsonii* (no known common name) was fairly common in the open herbaceous community type. Other butterfly species were observed, including the Common swallowtail (*Papilio xuthus*) and the Monarch (*Danaus archippus*).

Recent observations were reported of the Mariana eight-spot butterfly, along with *P. pedunculata* and *E. calcareum* along a rocky pinnacle karst area toward Pati Point, approximately 800 meters from the ASA (Lawrence 2006). A pair of Mariana eight-spot butterflies were observed defending an area from an individual *E. Eunice hobsonii*.

5.3.8 Incidental Observation of Other Listed Species

Methods

If the presence of other listed bird species was recorded if their presence was observed during all surveys. These species included the Guam rail, Micronesian kingfisher, Guam bridled white-eye (*Zosterops conspicillatus*), Mariana gray swiftlet (*Aerodramus bartschi*), and the Micronesian honeyeater (*Myzomela rubratra saffordi*).

Results

No observation of listed birds occurred during surveys.

5.4 NOISE MODELING

Methods

Aircraft noise modeling was accomplished to establish the noise levels for use in the effects determinations for the Mariana fruit bat and Mariana crow. A detailed description of noise modeling techniques used in this BA is include in Appendix D. Noise contours and day-night average sound level (DNL) values from airfield operations were developed for this BA using the NOISEMAP noise model, version 7.296. Maximum sound level noise used in this BA was calculated by using the Flyover Noise Calculator (USAF 2002).

NOISEMAP is a suite of computer programs developed by the Air Force to predict noise exposure in the vicinity of an airfield due to aircraft flight, maintenance, and ground run-up operations. Data describing flight tracks and flight profile use, power settings, ground run-up information by type of aircraft/engine, and meteorological variables are assembled and processed for input into NOISEMAP. The model uses this information to calculate DNL values at points on a regularly spaced grid surrounding the airfield. A plotting program generates contour lines connecting points of equal DNL values in a manner similar to elevation contours shown on topographic maps. Contours are generated as 5 decibel (dB) intervals beginning at DNL 65 dBA, the maximum level considered acceptable for unrestricted residential use. The contours produced by NOISEMAP are used in the effects determination in this BA.

In the absence of definitive data on the effect of noise on animals, the Committee on Hearing, Bioacoustics, and Biomechanics proposed that protective noise criteria for animals be taken to be the same as for humans (NAS 1977).

Results

Table 5-5 lists the results of noise modeling for a single aircraft overflight at the analysis points for the current condition airfield operation events and the Alternative A events. The noise levels are indicated in terms of maximum A-weighted sound level (L_{\max}) and sound exposure level (SEL). Appendix D contains a description of each noise metric. The noise values reflect the L_{\max} and SEL from a single aircraft overflight on the track nearest the analysis point and are based on the noisiest aircraft operating on the track. L_{\max} values are presented for points B, C, D, and F because of proximity to the ASA. Noise from the ASA reflects the condition at the point for four aircraft simultaneously starting up engines, spending the same amount of time in park with engines running at idle speed prior to taxi, and taxiing at

the same time because all four aircraft would depart as a formation in which the aircraft take off in sets of two with a slight delay between the two sets or with a slight delay between each aircraft. This four-aircraft formation event would produce more noise than the two-aircraft formation or the single aircraft events.

Table 5-5 Single Event Aircraft Noise Levels at Selected Points North of the Andersen AFB Airfield

	Point A	Point B	Point C	Point D	Point E	Point F
Current Condition Aircraft						
Aircraft altitude	274	457	457	457	457	457
L _{max}	109	88	82	107	109	89
SEL	112	95	91	112	116	96
Alternative A Aircraft						
Aircraft altitude	274	457	457	457	457	457
L _{max}	112	Noise level from Track operations: 92 Noise level from ASA operations: 73	Noise level from Track operations: 96 Noise level from ASA operations: 83	Noise level from Track operations: 92 Noise level from ASA operations: 58	108	Noise level from Track operations: 102 Noise level from ASA operations: 75
SEL	119	99	105	99	114	111

Note: Aircraft altitude indicated in meters AGL. Noise values are indicated in dBA. SEL noise values are based on noise from the noisiest aircraft operating on the track nearest the point for the condition. Lmax noise values are based on noise from the noisiest aircraft operating on the track nearest the analysis point and, for Points B, C, D and F, from aircraft while idling prior to taxi out after starting engines (10 minutes) and while parked and prior to engine shutdown (5 minutes) at the end of the sortie. Noise for the formation start up/taxi in the ASA was modeled for each aircraft and then combined using the guidance in Appendix D, Table D-1. A temperature of 80 degrees Fahrenheit and a relative humidity of 82 percent were used for the noise modeling climatological conditions.

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CHAPTER 6

EFFECTS DETERMINATION

This section presents the effects determinations of the proposed action on T&E and species of concern in and around the ASA and the Commercial Gate project area at Andersen AFB. The determination of “no effect” was applied for those species with no potential habitat in the ASA (as determined from literature review and field survey results). Construction activities associated with the proposed action were assessed to determine potential effects for those species with potential habitat in the proposed action project areas.

Effects determination for each T&E and sensitive species was based on the following definitions:

“No effect” – The T&E and sensitive species were not present in the proposed project areas or the proposed action would have no effect on the available habitat of T&E and sensitive species.

“May affect” –The proposed action may pose effects (any) on T&E species or designated critical habitat.

“May affect – is not likely to adversely affect” – T&E and sensitive species habitat or T&E and sensitive individuals could potentially be present in the proposed project areas, and the proposed action would have beneficial, insignificant, or discountable effects.

“May affect – is likely to adversely affect” – T&E and sensitive species habitat or T&E and sensitive individuals could potentially be present in the ASA, and adverse effects cannot be avoided.

Chapter 2 of this BA contains detailed descriptions of construction activities, operational activities, and conservation measures associated with the proposed action. In summary, construction activities will involve clearing of 73.9 hectares of land, some of which support elements of suitable habitat for listed species. Clearing to provide space for facilities construction will have the added effect of displacing listed and invasive species onto adjacent land. Effects of operational activities are associated with noise increases due to aircraft overflights.

6.1 EFFECTS OF CONSTRUCTION AND OPERATIONS ON LISTED SPECIES

The effects of construction and operations on federally listed species and species of concern at the ASA are discussed below.

Plants

Herritiera longipetiolata. A grove of *H. longipetiolata* will not be affected by construction or operations at the ASA or the Commercial Gate project areas because it is some distance away from the two projects. Conservation measures to reduce the potential effects associated with any Base activities include increasing awareness of environmental concerns, which includes identification of the tree, should more be located in the future.

Tabernaemontana rotensis. A number of *T. rotensis* individuals occur within the footprint of land clearance. Inventory for *T. rotensis* continues, and the plant appears to be more abundantly distributed than previously thought (Marler 2006). Conservation measures to reduce the effects associated with any Base activities include increasing awareness of environmental concerns, which includes identification of the plant and transplanting seeds and saplings outside the project footprint.

Serianthes nelsonii. The two remaining mature *S. nelsonii* individuals on Guam will not be affected by construction or operations at the ASA or the Commercial Gate project areas, because they are some distance away from the two projects. Conservation measures to reduce the potential effects associated with any Base activities include increasing awareness of environmental concerns, including identification of the tree, should more be located in the future.

Animals

Mariana Fruit Bat

No Mariana fruit bats were observed in the ASA or Commercial Gate project areas during the January 2006 survey (Parsons 2006). Figure 5-2 and Figure 5-3 show the primary habitat that would be disturbed in the ASA project area and the Commercial Gate project area, respectively. Figure 5-4 shows locations of recent observations of Mariana fruit bats.

Construction activities will remove secondary growth limestone forest associative trees such as *N. oppositifolia* and *Pandanus* shrubs used by the Mariana fruit bat for foraging (Wiles 1986). Construction will remove 57.5 hectares of potential forested and shrub habitat. This removed habitat is 1.3 percent of the GNWR Ritidian Unit and refuge overlay units. The most suitable habitat of these 57.5 hectares includes two areas of intact secondary forest overlying karst substrates totaling 1.4 hectares in the ASA. This relatively higher quality habitat lacks a sufficient emergent canopy layer to be considered primary limestone forest; however, the species composition and canopy structure suggest a higher foraging and roosting potential for the Mariana fruit bat. The 1.4 hectares of higher quality habitat of the 57.5 hectares of potential habitat represent 0.1 percent of the total refuge overlay and Ritidian unit. Construction activities may also lead to forest fragmentation, which may affect the Mariana fruit bat. Apparently the greatest threat to the Mariana fruit bat on Guam is predation by the BTS; however, habitat loss is also a concern on other islands in the Northern Mariana Islands archipelago (Fancy, *et al.* 1999b). Table 5-2 lists woody species of value to the Mariana fruit bat subject to clearance activities. Construction activities may affect the Mariana fruit bat. Due to the relatively small amount of habitat removed in relation to available habitat (refuge overlay and Ritidian Unit), and suitable conservation measures to offset effects, no adverse effects are expected.

Aircraft overflight would occur over areas that contain suitable habitat for roosting and foraging. Although there is suitable vegetation in the ASA and Commercial Gate vegetation community types, bats appear to prefer foraging habitat where there are more large fruit trees available, such as the *Neisosperma* – *Macaranga* forest, which contains suitable canopy. Figure 5-2 shows the primary habitat that would be disturbed. Figure 5-4 shows locations of recent observations of Mariana fruit bats. Figure 2-3 shows noise exposure contours from aircraft operations and aircraft flight track locations. Maximum noise levels at Pati Point

would not exceed those of the current conditions; however, the frequency of aircraft overflights will increase to an estimated three times per hour, based on additional flight tracks and aircraft operations. Under current conditions, Morton (1996) suggests that bats at the Pati Point colony have become relatively habituated to daytime aircraft noise and continue to roost there. It is unknown if bats would become habituated to more frequent noise, but recent observations indicate they have become habituated to aircraft noise (Janeke 2005). Studies of habituation in other animal species have not observed any level of tolerance that has eventually become unacceptable to the animals when the type of disturbance has remained constant. It is known that bats have very sensitive hearing, but the frequency spectrum is normally much higher than sounds being produced from training activities under this proposal (Dallard 1965).

Hearing sensitivity in a related megachiropteran fruit bat, *Rousettus aegyptiacus*, spans from about 2.25 kHz to 64 kHz at a 60 dB sound pressure intensity (Koay, *et al.* 1998). From a behavioral auditory threshold study of *Rousettus aegyptiacus*, their greatest sensitivity is in the range of 8-10 kHz (Suthers and Summers 1980), much higher than the frequency spectrum of aircraft. Interestingly, the study found no behavioral response to sounds below 1 kHz, which indicates that their sensitivity or even ability to hear below that level is low to nonexistent. Much of the acoustic energy of aircraft noise is below 2 kHz.

Habituation of bats to increased overflight noise is expected (Janeke 2005), especially since aircraft overflights will be incrementally increased over a multi-year period. The degree of habituation, however, is not represented in the current literature. Conservation measures involve an Adaptive Management strategy, which is commonly used when data gaps exist, to continually address noise effects as overflights increase. Conservation measures also allow for modification of overflight patterns to reduce effects of increased aircraft. Modifications will be based on proposed bat studies, as described in Subchapter 2.3.

Noise events associated with aircraft overflights may affect the Mariana fruit bat; however, adverse effects are offset by conservation measures. These conservation measures include the protection and management of 200 hectares of suitable habitat near Ritidian Point, BTS trapping at the Pati Point colony, and an adaptive management strategy that uses scientific research to affect operational changes to overflight routes.

Mariana Crow

The Mariana crow does not currently nest in the ASA or Commercial Gate project areas. Figures 5-2 and 5-3 show the primary habitat that would be removed in the ASA and Commercial Gate project areas, respectively. Figure 5-4 shows the locations of recent observations of the Mariana crow.

Despite the lack of crows within project areas, construction activities will remove secondary limestone forest associative trees such as *N. oppositifolia* and *G. mariannae* used by the Mariana crow for foraging and/or nesting. Construction activities may lead to forest fragmentation, which may affect the Mariana crow (Andren 1992; Fancy, *et al.* 1999a; Plentovich, *et al.* 2005). Although some small suitable habitat patches may be available after construction activities cease, crows may not use these patches extensively. Table 5-2 lists woody species of value to the Mariana crow subject to clearance activities.

Construction activities will remove 57.5 hectares of potential habitat in forested and shrub areas, which contain associative trees of the Mariana crow. This amount of removed habitat amounts to 1.3 percent of the Ritidian unit and refuge overlay. The most suitable habitat of these 57.5 hectares includes two areas of intact secondary forest overlying karst substrates totaling 1.4 hectares in the ASA. This relatively higher quality habitat lacks a sufficient emergent canopy layer to be considered primary limestone forest; however, the species composition and canopy structure suggest a higher attractiveness for the Mariana crow. The 1.4 hectares of higher quality habitat of the 57.5 hectares of potential habitat subject to removal represents 0.1 percent of the Ritidian unit total refuge overlay. Based on the relatively small amount of habitat removed and the lack of utilization within the project areas, vegetation clearance will not adversely affect current populations or future recovery of the Mariana crow.

Operational activities include aircraft overflight. Crows are sensitive to human disturbances, and may be particularly sensitive to noise generated from aircraft (Morton 1996). Aircraft overflights would occur over areas that contain suitable habitat for nesting and foraging. Figure 2-3 shows the noise exposure contours from ISR/Strike aircraft operations. Morton (1996) demonstrated that Mariana crows will react negatively to aircraft overflight noise and other human disturbances in some cases, but not always. Noise disturbance of the Mariana crow can cause distress in the birds, cause them to flush from the nest and disrupt nest building, incubation, and nest attendance at least temporarily. However, if the Mariana crow nests are abandoned due to disturbance or predation, the pairs will generally attempt to re-nest (Morton 1996). In addition, crows may respond to visual stimuli as well as noise stimuli (e.g., aircraft outlines, pedestrians). Other studies demonstrate that birds are likely to hear loud noises (e.g., sonic booms), and stop the activity in which they are engaged (Higgins 1974), but a *Corvus* species study showed the birds rapidly returned to normal activities after the noise event (Davis 1967).

There is some indication that Mariana crows can be tolerant of disturbances, much like related species of crows throughout the world. The fact that Morton (1996) has observed some pairs renesting after nest disturbances may indicate their tenacity. This tolerance can lead to habituation of disturbances that are not threatening to the individuals. Habituation is a process many species of animals undergo to cope or tolerate environmental stimuli inconsequential to their livelihood or well-being. Animals like those discussed in this study respond to visual and acoustic stimuli potentially harmful to them. Typically this is due to their innate predator-prey response mechanism, which causes an increase in alertness or flushing or fleeing from the impending threat. There are many studies showing that reoccurring events without consequence cause animals to eventually ignore those stimuli (The Wildlife Society 2005). Busnel (1978) observed that many species are able to habituate to noise disturbance. Andersen, *et al.* (1989) concluded that Red-tailed hawks could have habituated to aircraft. Becker (2002) suspected roosting Bald eagles were habituated to disturbance when exposed to a large industrial construction project. Delaney, *et al.* (1999) found that endangered Mexican spotted owls become habituated to disturbances like chainsaw noise and helicopter noise. Observations of Mariana crows and Mariana fruit bats by Morton (1996) during aircraft flyover events demonstrated that there were reactions in some cases where some observed individuals responded to the noise or visual stimuli and others did not. This could be due to the experience level of the animals, where resident crows or bats were habituated to the aircraft events, and non resident or young were not accustomed to the intrusions.

Aircraft altitudes in areas where the Mariana crows have established nests in the past (Morton 1996) would be 300 meters AGL and greater. Noise modeling was accomplished to determine the maximum sound level at two of the 10 analysis points (*i.e.*, Pati Point and Tarague Channel) and four other points in the area north and northwest of the airfield where there is suitable habitat for Mariana crow nesting activities. Sound levels from noise modeling were compared to information from the Morton (1996) study to determine the potential for effect.

Based on noise modeling, the maximum sound level produced by any of the ISR/Strike aircraft would be 108 dBA by B-1 aircraft at Pati Point, and 87 dBA by F-22 aircraft at Tarague Channel. The maximum sound level at any of the four other points in the area north and northwest of the airfield would be 109 dBA from the F-22 aircraft.

Noise modeling indicated that the maximum sound levels (L_{\max}) produced under the proposed action (*i.e.*, 108 dBA by the B-1 aircraft at Pati Point) would be 2 dBA less than the maximum noise from the Morton (1996) study (*i.e.*, 110 dBA). Additionally, the maximum proposed action sound level at any of the four other points north and northwest of the airfield where the Mariana crow is known to occur would be 109 dBA, which is 1 dBA less than the Morton (1996) study. Noise from aircraft overflights did not cause nest abandonment for at least one pair of Mariana crows when aircraft were restricted to altitudes greater than 300 meters AGL (Morton 1996). Based on the similarities of the maximum noise levels and AGL when comparing the Morton (1996) study and the proposed action, Mariana crow reaction to noise would be expected to be similar or less than that found in the Morton study; that is, some crows might be flushed from the nest, while others show no negative effects. Additionally, there is a possibility that Mariana crows will habituate to the aircraft noise since there is no negative reinforcement to cause nest abandonment.

Noise from aircraft overflights are expected to affect Mariana crow behavior. Conservation measures will reduce these effects by applying an adaptive management strategy to modify ground tracks based on monitoring studies. Further, conservation measures will designate approximately 200 hectares of forested land, some of which is currently utilized by the Mariana crow, as a conservation land use category. Management actions for these 200 hectares include ungulate exclosure fencing, ungulate depredation hunts, and forage plot establishment.

Micronesian Kingfisher

The Micronesian kingfisher has been extirpated from the wild and persists in captive breeding populations. Survey data from 1981 indicate that Micronesian kingfishers were present in the northern portion of Andersen AFB, but not at Andersen main. Construction will remove 57.5 hectares of secondary growth forest and shrubby areas that are potential foraging and nesting habitat for the Micronesian kingfisher. The area represents 1.3 percent of the refuge overlay and Ritidian unit. Of the 57.5 hectares of potential habitat for the Micronesian kingfisher, 1.4 hectares have been identified as more suitable habitat, which amounts to 0.1 percent of the refuge overlay and Ritidian unit. Table 6-4 lists woody species of value to the Micronesian kingfisher subject to clearance activities.

The small amount of habitat loss from the proposed action would have no impact on plans to reintroduce the species in the MSA. Habitat for this species within the MSA would not

be disturbed by construction. The DNL 65 dBA noise contour from aircraft operations would extend into the southernmost portion of the MSA area (2-3). Maximum sound pressures from aircraft overflight in the southern MSA is 97 dBA.

Guam Rail

Guam rails have been extirpated in the wild and persist as captive breeding populations. As a ground nesting species, the Guam rail is particularly susceptible to predation by the BTS and egg predation by feral pigs and feral cats (GovGuam DAWR 1999; 2000c).

Construction in the ASA and Commercial Gate project areas will remove 34.2 hectares of suitable habitat. This amount of vegetation represents 1 percent of the refuge overlay and Ritidian unit. Because of the relatively small amount of habitat subject to clearance, and due to the lack of a wild population, construction activities will not adversely affect the recovery efforts of the Guam rail. Further, areas previously targeted for re-introductions will not be subject to noise increases sufficient to adversely affect the recovery efforts of the Guam rail.

Mariana Islands Tree Snail, Pacific Tree Snail, Mariana Islands Fragile Tree Snail

Suitable habitat for all three species includes mesic, relatively closed-canopy forest, where ground disturbance has been minimal or absent. Although degraded, some habitat is present in the ASA project area. No snails were observed during the field surveys. The presence of invasive snail predators reduces the potential success for this species (Hopper and Smith 1992; Wiles, *et al.* 1995; GovGuam DAWR 2005). Construction will remove 1.4 hectares of suitable habitat. This represents less than 0.1 percent of the refuge overlay and Ritidian unit. Removal of snail habitat for these snails is small enough to not adversely affect current populations. Further, aircraft overflights are expected to have no effect on the snail species recovery or current populations.

Mariana Eight-spot Butterfly

No butterflies or associative plants were observed in the ASA or Commercial Gate project areas during the January 2006 survey. Although degraded due to ungulate browse pressure, there is a small amount of potential karst habitat present in the ASA. Construction will remove 1.4 hectares of potentially suitable habitat. This represents less than 0.1 percent of the refuge overlay and Ritidian unit. This relatively small amount of habitat subject to removal will not adversely affect the Mariana eight-spot butterfly. In addition, aircraft overflights are not expected to adversely affect this species of butterfly.

6.2 OFFSITE EFFECTS FOR T&E SPECIES

Base population could increase by about 3,000 persons when considering the additional military personnel and dependents. These individuals would travel to and from Guam and Andersen AFB by commercial air carrier flights that use Guam International Airport. The majority of the household goods belonging to the permanently assigned personnel would be shipped as cargo in ships. Thus, there could be an additional approximate 220 household good shipments each year. The additional containers for the household goods would require USDA inspection for the BTS. The USDA will use the updated BTS inspection procedures to attain 100 percent inspection of outgoing ships and cargo. Rotational personnel would bring only personal effects and these articles could be accommodated as baggage on the aircraft on which

the individuals travel. Because 100 percent inspection of all outbound cargo from Andersen AFB will occur, the proposed action will not adversely affect offsite T&E species.

6.3 INVASIVE SPECIES

Removal of habitat and active training will displace Philippine deer, feral pigs, and the BTS in the ASA and Commercial Gate project areas. Ungulate browse pressure may increase in more intact secondary forest adjacent to the ASA, and increase the overall ungulate density in available habitat on Andersen AFB. This would further reduce recruitment of native forest species.

6.4 SUMMARY OF EFFECTS DETERMINATION

The effects determinations for species relevant to this BA are listed in Table 6-1.

Table 6-1 Effects Determination

Species	Potential Effects of Construction	Potential Effects of Operations
<i>Heritiera longipetiolata</i>	No effect	No effect
<i>Serianthes nelsonii</i>	No effect	No effect
<i>Tabernaemontana rotensis</i>	May affect	May affect
Mariana fruit bat	May affect	May affect
Mariana crow	May affect	May affect
Micronesian kingfisher	May affect	May affect
Guam rail	May affect	May affect
Mariana Islands tree snail	May affect	No effect
Pacific tree snail	May affect	No effect
Mariana Islands fragile tree snail	May affect	No effect
Mariana eight-spot butterfly	May affect	No effect

Overall, the proposed action may affect - but not adversely affect, populations of existing species as well as species recovery. Further, no adverse modifications to species habitat associated with the proposed action will occur. The effects determination for the proposed action is based on the following assumptions:

- Existing conditions for listed species within habitat areas of the overlay refuge continue to degrade. Excessive ungulate pressure prevents recruitment of emergent canopy species within forested areas, while BTS predation limits recovery of listed species.
- The size of the areas subject to clearance are relatively small in comparison to available habitat. Vegetation clearance will remove less than 74 hectares, which represents approximately 1.6 percent of the combined area of the GNWR Ritidian Unit and refuge overlay units. This small amount of clearance will not adversely affect listed species.
- Noise from aircraft overflights will affect Mariana fruit bat and Mariana crow recovery efforts, as well as current populations. Based on current literature and field observations, habituation to an incremental increase of overflights is expected. Further, adverse effects that do become apparent due to aircraft operations will initiate

modifications to aircraft ground tracks and profiles over sensitive areas, through an adaptive management strategy. This adaptive management strategy involves a multi-year monitoring program of noise effects using up to date standards for acoustical studies on sensitive species that will affect operational changes.

- Implementation of the conservation measures described in Chapter 2 will reverse the continued degradation of approximately 200 hectares of important habitat, and therefore, contribute to the recovery of listed species. In addition, conservation measures address issues associated with exotic predator interdiction and control. Many of the conservation measures correspond directly to management needs identified as critical recovery actions in USFWS recovery plans for listed species. Further, the conservation measures will effectively manage areas of higher quality habitat for listed species. Therefore, the species will utilize the better quality habitat that will be effectively enhanced by the conservation measures, rather than the relatively lower quality habitat currently present at Andersen main.

CHAPTER 7 CONSERVATION MEASURES

Conservation measures are described in detail in Subchapter 2.2. The following summary list of conservation measures was designed to offset any adverse effects to current populations and future recovery of listed species caused by the proposed action

- ***Alteration of the ASA construction footprint.*** Cooperation between planners, civil engineers, and biologists allowed for alteration of the original ASA construction footprint to reduce clearance within relatively intact secondary limestone forest areas.
- ***Wildlife Management Specialist.*** This position will be filled by a qualified candidate who will manage population densities, including depredation hunts within enclosure areas, record information on ungulate kills (for demographic analysis), trap exotic predators, perform fenceline reconnaissance for maintenance, and coordinate with resource agencies.
- ***Ungulate enclosure fencing:*** This conservation measure provides for construction of ungulate enclosures totaling 200 hectares near Ritidian Point. Fencing will be suitable to exclude both deer and pig. Depredation hunts will be conducted in conjunction with the fencing program. This enclosure will provide areas for forest recovery without browse pressure. Further, modifications to the Andersen AFB General Plan will change the land use category for fenced areas to an appropriate conservation designation.
- ***Ungulate management and control:*** A multi-year ungulate control plan will be developed in cooperation with USFWS and DAWR. Research relevant to ungulate control and ecology on Guam will be facilitated through the Wildlife Management Specialist who will be tasked with the technical field aspects of ungulate research.
- ***BTS trapping at Pati Point:*** This conservation measure seeks to directly counter the lack of pups within the Pati Point bat colony. BTS predation, although most likely not the sole factor in pup mortality, is a main concern. Traps will be deployed and maintained by the proposed Wildlife Management Specialist.
- ***Outplanting of foraging trees important to the Mariana fruit bat and Mariana crow.*** This conservation measure provides for establishment of foraging plots within ungulate enclosures. Plots will contain foraging trees, thereby offering alternative habitat for the Mariana fruit bat and Mariana crow. Supplemental fencing will surround the five plots proposed within the ungulate enclosure.
- ***Vegetation surveys relevant to recovery of the Mariana fruit bat and Mariana crow:*** This conservation measure provides for Base-wide surveys of important tree species and area-specific habitat assessments. Additional emphasis will be placed on locations and fruiting seasons of trees essential to bat recovery.
- ***Noise studies:*** Noise studies using a current protocol for acoustics measurements will be initiated to determine habituation to the incremental increase in noise expected from the proposed action. Results of the noise studies will be used to make science-based management decisions to alter ground tracks to lessen noise levels in sensitive areas.

- ***Environmental Education and Awareness Information:*** Awareness training on the identification of listed plant and animal species for transient and permanent personnel will reduce effects associated with training activities. Increased awareness and reporting of BTS sightings will assist USDA and Base personnel in tracking BTS abundances and locations.
- ***BTS Interdiction:*** The BTS inspection policy will ensure 100 percent inspection of all outbound craft (air and water) from Andersen AFB. A Base Operating Instruction for BTS interdiction further ensures a 100 percent inspection standard. The Air Force has started the internal process to provide a 5-year agreement with USDA WS for the use of Building 22002 on Andersen main. It is anticipated that this agreement will provide enhanced infrastructure stability for the BTS interdiction program. USDA WS BTS interdiction efforts will be funded and supported commensurate with mission increases.

CHAPTER 8 REFERENCES

- Amidon 2005. Email from Fred Amidon to Dana Lujan re Vegetation Sampling and Survey Design. November 4, 2005.
- Andersen, *et al.* 1989. Andersen, D.E., O.J. Rongstad, and W.R. Mytton, Response of nesting red-tailed hawks to helicopter overflights. *Condor*, 91:296-299.
- Andersen AFB 2002. Department of the Air Force, *Draft Area 50 Restoration Project*, Andersen Air Force Base, Guam. 2002
- Andersen AFB 2003. Department of the Air Force, 36th Air Base Wing Civil Engineer Squadron, *Integrated Natural Management Resources Plan*, Andersen Air Force Base, Guam, December 2003.
- Andren 1992. Corvid density and nest predation in relation to forest fragmentation: Andren H. A Landscape Perspective. *Ecology* 73(3): 794-804.
- Baskerville, G. 1985. Adaptive management: wood availability and habitat availability. *Forestry Chronicle* 61: 171-175.
- Becker 2005. Becker, J.M., Response of wintering bald eagles to industrial construction in southeastern Washington. *Wildlife Society Bulletin* 30:875-878.
- Bibby, *et al.* 2000. 2000. *Bird Census Techniques, Second Edition*. Academic Press Cornwall, United Kingdom. Bibby, C. J., N. D. Burgess, D. A. Hill, S. H. Mustoe
- Brooke 2005. U.S. Fish and Wildlife Service, Guam National Wildlife Refuge, Ann Brooke personal communication November 2005.
- Brooks, *et al.* 1998. The oral and dermal toxicity of selected chemicals to brown tree snakes (*Boiga irregularis*). Brooks, J.E., P.J. Savarie and J.J. Johnston. *Wildlife Research* 25: 427-435.
- Busnel 1978. Busnel, R.G., Introduction. In *Fletcher, J.L. and R.G. Busnel*. Effects of noise on wildlife. Academic Press, New York.
- Cox and Elmqvist 2000. Pollinator extinction in the Pacific Islands. Cox, P.A. and T. Elmqvist. *Conservation Biology* 14:1237-1239.
- Dallard 1965. Hearing sensitivity in bats. Dallard, J.I. *Science* 150:1185-1186.
- Davis 1967. Ravens' response to sonic bang. P. Davis. *British Birds* 60(9): 370-371.
- Dicke 2005. Guam Department of Agriculture, Division of Aquatic and Wildlife Resources, B. Dicke, personal communication November 2005.
- Dicke 2006. Guam Department of Agriculture, Division of Aquatic and Wildlife Resources, B. Dicke, personal communication January 2006.
- Donnegan, *et al.* 2004. Guam's Forest Resources, 2002. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Donnegan, J.A. S.L. Butler, W. Grabowiecki, B.A. Hiserote, D. Limtiaco. *Resource Bulletin PNW-RB-243*.
- Engeman, *et al.* 1998. A review of the case histories of the brown tree snakes (*Boiga irregularis*) located by detector dogs on Guam. Engeman, R.M., D.V. Rodriguez, M.A. Linnell, M.E. Pitzler. *International Biodeterioration and Biodegradation* 42: 161-165.
- Fancy, *et al.* 1999a. Status of the Mariana Crow population on Rota, Mariana Islands. Fancy, S.G., M.R. Lusk, and D.J. Grout. *Micronesica* 32(1): 3-10.
- Fancy, *et al.* 1999b. Forest bird and fruit bat populations on Sarigan, Mariana Islands. Fancy, S. G., R. J. Craig, and C. W. Kessler. *Micronesica* 31(2) 247-254.

- Fosberg 1960. The vegetation of Micronesia. General descriptions, the vegetation of the Marianas Islands, and a detailed consideration of the vegetation of Guam, F.R. Fosberg. *Bulletin of the American Museum of Natural History*. 119(1): 55-75.
- GovGuam DAWR 1999. Government of Guam, Division of Aquatic & Wildlife Resources. Establishment of populations of Endangered Species in Snake Free Areas. FY 1999 Report. Period covered: October 1, 1998 to September 30, 1999. (also located at: <http://www.guamdawr.org/reports/fy99/99RailsArea50.pdf>).
- GovGuam DAWR 2000a. Government of Guam, Division of Aquatic & Wildlife Resources. Surveys for Mariana Crows and their nest sites on Guam and Rota. FY 2000 Report. Period covered: October 1, 1999 to September 30, 2000. (also located at: http://www.guamdawr.org/reports/fy00/FY00_Crownest.pdf).
- GovGuam DAWR 2000b. Government of Guam, Division of Aquatic & Wildlife Resources. Translocation of Mariana Crows. FY 2000 Report. Period covered: October 1, 1999 to September 30, 2000. (also located at: http://www.guamdawr.org/reports/fy00/FY00_TransCrow.pdf).
- GovGuam DAWR 2000c. Government of Guam, Division of Aquatic & Wildlife Resources. Establishment of a Guam Rail population at Area 50, Northwest Field, Andersen AFB. FY 2000 Report. Period covered: October 1, 1999 to September 30, 2000. (also located at: http://www.guamdawr.org/reports/fy00/FY00_NWFRails.pdf).
- GovGuam DAWR 2005. Government of Guam, Division of Aquatic & Wildlife Resources. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). (also located at: <http://www.guamdawr.org/Conservation/gcwcs2/>).
- Higgins 1974. The response of songbirds to the seismic compression waves preceding sonic booms. Higgins, T.H. Federal Aviation Administration Report AD-780-050. 21pp.
- Holling 1978. Adaptive environmental assessment and management. John Wiley, New York, New York, USA, J.C. Holling, ed.
- Hopper and Smith 1992. Status of tree snails (*Gastropoda: Partulidae*) on Guam, with a resurvey of sites studied by H. E. Crampton in 1920. Hopper, D.R. and B.D.Smith. *Pacific Science* 46: 77-85.
- James and Shugart 1970. A quantitative method of habitat description. James, F.C. and H.H. Shugart. *Audubon Field Notes*, volume 24: 727-736.
- Janeke 2005. University of Guam Masters Degree Student, D. Janeke, personal communication November 2005.
- Jester and Dillard 2002. Conducting White-tails deer spotlight surveys. Texas Parks and Wildlife Publication Number 32a-4. Jester, S. and J. Dillard. Texas Parks and Wildlife Department, Austin, Texas.
- Johnston, *et al.* 2002. Risk assessment of an acetaminophen baiting program for chemical control of brown tree snakes on Guam: Evaluation of baits, snake residues, and potential primary and secondary hazards. Johnston, J.J., P.J. Savarie, T.M. Primus, J.D. Eisemann, J.C. Hurley, and D.J. Kohler. *Environmental Science and Technology* 36: 3827-3833.
- Knutson and Vogt 2002. Philippine Deer (*Cervus mariannus*) and feral pig (*Sus scrofa*) population sampling in the secondary limestone forests of northern Guam. Knutson, K. and S. Vogt. Report for Anderson Air Force Base, U.S. Fish and Wildlife Service, Environmental Office, Andersen Air Force Base, Guam and Guam National Wildlife Refuge.
- Koay, *et al.* 1998. Koay, G., Heffner, R.S., and Heffner, H.E. Hearing in a megachiropteran fruit bat, *Rousettus aegyptiacus*. *Journal of Comparative Psychology* 112, 371-382.

- Krieg 2005. Honorable Kenneth J. Krieg, Under Secretary of Defense. Letter dated November 7, 2005, to Senator Daniel K. Inouye, and Congressmen Neil Abercrombie and Ed Case.
- Lawrence 2006. Holom Tamo, LLC. J. Lawrence, personal communication November 2005.
- Lee 1985. Common Weeds of Guam. C.T. Lee. Guam Agricultural Experiment Station, University of Guam.
- Lujan 1996. Nest site characteristics of the Endangered Mariana Crow (*Corvus kubaryi*) on Guam. Dana Lujan, Unpublished manuscript, Oregon State University.
- Lujan 2005. Andersen AFB, 36 CEV/CEVN. Dana Lujan, personal communication November 2005.
- Marler 2006. Email from Thomas Marler to Jonathan Wald, 36 CES/CEV, containing information on *Tabernaemontana rotensis* on Andersen AFB, February 2, 2006.
- Moore 2005. Cycad scale, *Aulacaspis yasumatsui* (Homoptera: Diaspididae). Micronesian Invasive Insect Survey website. A. Moore. Also available at: <http://www.micronesianinsects.com/IIR/2004.03.htm>
- Moore and McMakin 2005. Plants of Guam. University of Guam, Department of Agriculture and Life Science. Moore, P.H. and P. McMakin. Cooperative Extension Service. (also available at: <http://www.uog.edu/cals/site/POG/POGHome.html>)
- Morton 1996. The effects of aircraft overflights on endangered Mariana crows and Mariana fruit bats at Andersen Air Force Base, Guam. J.M. Morton. Technical report prepared by the U. S. Fish and Wildlife Service for the Department of the Navy. 81pp.
- Morton, *et al.* 2000. Structure of a Limestone Forest on Northern Guam. Morton, J.M., F.A. Amidon, and L.R. Quinata. *Micronesica* 32: 229-244.
- NAS 1977. National Academy of Sciences (NAS), 1977. "Guidelines for Preparing Environmental Impact Statements on Noise" Report of Working Group on the Committee on Hearing, Bioacoustics, and Biomechanics, National Research Council. Washington, D.C.
- Parsons 2005. Field Studies Survey Report for Vegetation, Ungulates, and other threatened and endangered species. November 2005.
- Parsons 2006. Field Studies Survey Report for Vegetation, Ungulates, and other threatened and endangered species. January 2006.
- Perry and Morton 1999. Regeneration rates of the woody vegetation of Guam's Northwest Field following major disturbance: land use patterns, feral ungulates, and cascading effects of the brown treesnake. Perry, G. and J.M. Morton. *Micronesica* 31: 125-142.
- Plentovich, *et al.* 2005. Population trends of Mariana Crow *Corvus kubaryi* on Rota, Commonwealth of the Northern Mariana Islands. Plentovich, S., J.M. Morton, J. Bart, R.J. Camp, M. Lusk, N. Johnson, and E. Vanderwerf. *Bird Conservation International* 15: 211-224.
- Quinata 1994. Vegetation Baseline Survey – Andersen Air Force Base, Guam. L.R. Quinata. Prepared for U.S. Fish and Wildlife Service.
- Raulerson and Rinehart 1991. Trees and Shrubs of the Northern Mariana Islands. Raulerson, L. and A. Rinehart. Coastal Resources Management, Office of the Governor, Commonwealth of the Northern Mariana Islands, Saipan, Northern Mariana Islands.
- Rodda, *et al.* 1999. An overview of the biology of the Brown tree snake (*Boiga irregularis*), a costly introduced pest on Pacific Islands. Rodda, G.H., T.H. Fritts, M.J. McCoid, and E.W. Campbell, III. Pages 44-80 in Rodda, G.H., Y. Sawai, D. Chiszar, and H. Tanaka (eds.) *Problem Snake Management: The habu and the brown tree snake*. Cornell University Press, Ithaca, NY. 534 pp.

- Savarie, *et al.* 2001. Use of acetaminophen for large-scale control of brown treesnakes. Savarie, P.J., J. A. Shivik, G.C. White, J.C. Hurley, and L. Clark. *Journal of Wildlife Management* 65: 356-365.
- Savidge 1987. Extinction of an island forest avifauna by an introduced snake. J.A. Savidge. *Ecology* 68:660-668.
- Schreiner 1997. Demography and recruitment of selected trees in the Limestone forest of Guam in relation to introduced ungulates. I.H. Shriner. *Micronesia* 30(1): 169-181. Shult and Armstrong 2002. Deer census techniques. Shult, M.J. and B. Armstrong. Texas Parks and Wildlife Publication number 16a-2. Texas Parks and Wildlife Department, Austin, Texas.
- Space and Falanruw 1999. Observations on invasive plant species in Micronesia. Space, J.C. and M.Falanruw. Prepared for the Meeting of the Pacific Islands Committee, Council of Western State Foresters, Majuro, Republic of the Marshall Islands, February 22-26, 1999.
- Suthers and Summers 1980. Suthers RA, Summers CA, Behavioral audiogram and. masked thresholds of the megachiropteran echolocating bat, *Rousettus*. *Journal of Comparative Physiology* 136:227-233.
- The Wildlife Society 2005. Annotated Habituation Bibliography. http://www.nature.nps.gov/biology/wildlifemanagement/annotated_habituation_bibliography.pdf
- Tobin, *et al* 1999. Nightly and seasonal movements of *Boiga irregularis* on Guam. Tobin, M.E., R.T. Sugihara, R.A. Pochop, and M.A. Linnell. *Journal of Herpetology* 33: 281-291.
- Tomback 1986. Observations on the behavior and ecology of the Mariana Crow. D.F. Tomback. *Condor* 88: 398-401.
- USAF 2000. United States Air Force. 2000. Environmental Assessment: Andersen Air Force Base Cargo Parachute Drop Zone. 103pp.
- USAF 2002. Flyover Noise Calculator, Version 1.0.2, beta, USAF/AFRL/HECB, Wright-Patterson AFB, OH, May 2002.
- USAF 2005. Environmental Assessment of Proposed Munitions Storage Igloo Construction at Andersen Air Force Base, Guam. United States Air Force, October 2005.
- USAF 2006. Brown Snake Control Plan. Prepared by order of the Commander, 36th Air Expeditionary Wing (PACAF); 36 AEW Instruction 32-7004. 15 January 2006.
- USFWS 1984. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for seven birds and two bats of Guam and the Northern Mariana Islands. *Federal Register* 49 (167): 33881-33885.
- USFWS 1987a. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for *Serianthes nelsonii*, Merr. (Hayun Lagu or Tronkon Guafi). *Federal Register* 52 (32): 4907 – 4910.
- USFWS 1987b. Mariana Island's population of the Vanikoro Swiftlet (*Aerodramus vanikorensis bartschi*) Recovery Plan. Agency Draft. U.S. Fish and Wildlife Service, Portland, Oregon.
- USFWS 1989. Endangered and Threatened Wildlife and Plants; Determination of Experimental Population Status for an Introduced Population of Guam Rails on Rota in the Commonwealth of the Northern Mariana Islands. *Federal Register* 54 (208): 43966-43970.
- USFWS 1990a. Native forest birds of Guam and Rota of the commonwealth of the Northern Mariana Islands Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. (Also available at: http://ecos.fws.gov/docs/recovery_plans/1990/900928.pdf).
- USFWS 1990b. Mariana Fruit Bat (Guam Population) and Little Mariana Fruit Bat Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon.

- USFWS 1994. Recovery plan for *Serianthes nelsonii*. U.S. Fish and Wildlife Service, Pacific Region.
- USFWS 2000. Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for Three Plants from the Mariana Islands and Guam. *Federal Register* 65 (106): 35025 – 35033.
- USFWS 2002. Endangered and Threatened Wildlife and Plants; Review of Species that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petitions; Annual Description of progress on listing actions. *Federal Register* 67 (114): 40657-40679.
- USFWS 2004a. Endangered and Threatened Wildlife and Plants; Proposed endangered status for three plants from the Mariana Islands and Guam. *Federal Register* 69 (6):1560 - 1561.
- USFWS 2004b. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Mariana Fruit Bat and Guam Micronesian Kingfisher on Guam and the Mariana Crow on Guam and in the Commonwealth of the Northern Mariana Islands. *Federal Register* 69 (208):62944 - 62990.
- USFWS 2004c. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status and Prudency Determination for Designation of Critical Habitat for Two Plant Species from the Commonwealth of the Northern Mariana Islands. *Federal Register* 69 (68): 18499 – 18507.
- USFWS 2004d. Draft Revised Recovery Plan for the Sihek or Guam Micronesian Kingfisher (*Halcyon cinnamomina cinnamomina*). Region 1, US Fish and Wildlife Service, Portland, Oregon.
- USFWS 2005a. Endangered and Threatened Wildlife and Plants; Mariana Fruit Bat (*Pteropus mariannus mariannus*): Reclassification from Endangered to Threatened in the Territory of Guam and Listing as Threatened in the Commonwealth of the Northern Mariana Islands. *Federal Register* 70 (4):1190 - 1210.
- USFWS 2005b. Draft Revised Recovery Plan for the Aga or Mariana Crow (*Corvus kubaryi*). US Fish and Wildlife Service, Portland, Oregon.
- USFWS 2005c. General information about endangered species, also found at: USFWS 2005, <http://www.fws.gov/pacificislands/wesa/marianabatindex.html>
- Vice, *et al.* 2004. Summary to Guam's Outbound Cargo Handling Process: Preventing the spread of the Brown Treesnake. Vice, D.S., M.A. Linnell, and M.E. Pitzler Draft Report, U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Guam.
- Walters 1986. Adaptive management of renewable resources. Walters, C.J. McMillan, New York, New York.
- Wiles 1986. Current research and future management of Marianas Fruit Bats (*Chiroptera Pteropodidae*) on Guam. G.J. Wiles. *Aust. Mammal* 10: 93-95.
- Wiles 1994. The flying fox trade: a new dilemma. G.J. Wiles. *Bats Magazine* 12:15-18. Published by Bat Conservation International.
- Wiles, *et al.* 1995. The status and distribution of endangered animals and plants in northern Guam. Wiles, G.J., C.F. Aguon, G.W. Davis, and D.J. Grout. *Micronesia* 28(1):31-49.
- Wiles, *et al.* 2003. Impacts of the Brown Tree Snake: Patterns of decline and species persistence in Guam's Avifauna. Wiles, G.J., J. Bart, R.E. Beck, Jr., and C.F. Aguon. *Conservation Biology* 17: 1350-1360.
- Wiles 2005. Decline of a population of wild seeded breadfruit (*Artocarpus mariannensis*) on Guam, Mariana Islands. G.J. Wiles. *Pacific Science* 59: 509-522.

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APPENDIX A CORRESPONDENCE CONCERNING SECTION 7 CONSULTATION

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DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES

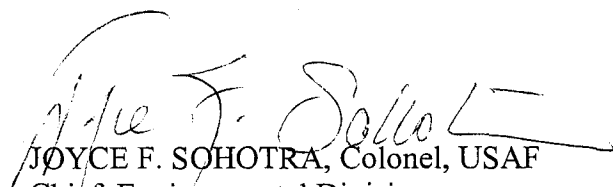
MEMORANDUM FOR U.S. FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Suite 3-122
Honolulu, HI 96813

22 Mar 05

FROM: HQ PACAF/CEV
25 E Street, Suite D-306
Hickam AFB, HI 96853-5412

SUBJECT: Notice of Consultation for Andersen Air Force Base (AFB), Guam

1. In accordance with Section 7 of the Endangered Species Act, the Air Force (AF) is pursuing consultation and conference for the proposed basing actions at Andersen AFB, Guam. As an active partner of Andersen's wildlife refuge initiative, the AF is ready for cooperative discussion and engagement with your office.
2. The AF proposes two separate basing initiatives at Andersen AFB. The first initiative entails basing of training and support units (non-aircraft related) at Northwest Field. This initiative enables co-location of three geographically separated training organizations at Guam. Secondly, the AF proposes to increase aircraft presence on the main base area of Andersen AFB. The new aircraft's mission is to establish an intelligence, surveillance, reconnaissance, strike, and refueling capability in the Pacific region.
3. If members of your staff have any questions, please call my point of contact Mr. Dana Lujan at 315-366-3049 or email: dana.lujan@andersen.af.mil.


JOYCE F. SCHOTRA, Colonel, USAF
Chief, Environmental Division
Directorate of The Civil Engineer

-----Original Message-----

From: Fred_Amidon@fws.gov [mailto:Fred_Amidon@fws.gov]
Sent: Friday, November 04, 2005 6:56 AM
To: Lujan Dana Civ 36 CES/CEV
Cc: Leilani_Takano@fws.gov
Subject: Vegetation Sampling and Survey Design

Dana,

I read through the vegetation sampling design for the northwest field project that Jon Ostil forwarded to Leilani. The proposed plot sampling should provide a good assessment of the vegetation within the areas proposed for clearing. However, since the primary concern from the federally listed species standpoint is the presence of Serianthes trees/saplings or trees that are utilized for foraging or breeding by listed species it is probably not necessary to do the herbaceous vegetation plots. Also, since the availability of habitat for foraging or breeding may also be limited due to disturbance from training activities we would also need a better assessment of the vegetation within the entire project footprint, which includes all of the training areas. I thought something similar to the methods used in the MSA igloos project would be appropriate. That is, classifying the secondary limestone forest into types (e.g., vitex dominated forest, artocarpus forest, tangentangen thickets, casuarina groves, etc.), quantifying the amount of each forest type in the project footprint, and noting if trees utilized by Mariana crows and fruit bats are present in each forest type (I can write up a list of these tree species if you like).

In addition to the vegetation sampling, the following surveys and data synthesis would be need to assess project impacts to species:

1. Mariana Crow - Point count stations should be setup in the project footprint and adjacent areas (just outside the project footprint) that would provide complete coverage of the project site. Ideally each station would be sampled for at least three mornings and three evenings during good weather to determine if crows are in the area. If crows are detected, their location should be marked on a map and included in the biological assessment. You can also check with DAWR to see if they have a preferred sampling method as well. In addition to the surveys, it would also be beneficial to include any observations of crows in the area by DAWR or anyone else in the last year or two, if available. Historic locations of crow nest sites in or adjacent to the project area are also useful for assessing the importance of the forest areas to crows. So a map of these nest sites, with the year of the nest noted, would be excellent.

2. Mariana Fruit Bat - Survey stations should be setup around the project footprint and adjacent areas to try to determine if any fruit bats are roosting in the project area. Ideally these stations should be a good vantage points where you can overlook large sections of the project area and should be surveyed for approximately an hour and a half, starting a half hour before sunrise. Ideally each station should be surveyed two to three times during good weather. In addition, fruit bat sightings by DAWR, Dusty, or anyone else in the project area over the last two years should be noted,

1 on a map if possible, along with any historical locations of fruitbats in
2 the area.

3
4 3. Serianthes - Surveys for serianthes should be done in the areas to be
5 cleared. The vegetation sampling along with efforts to look for Serianthes
6 while moving to and from vegetation sampling points should suffice if these
7 forests experienced recent disturbance. However, if there are patches of
8 forest that were not cleared since the base was established they should be
9 searched a little more thoroughly since its possible that there may be a
10 Serianthes tree in those areas. Using old aerial photographs of this area
11 should give you a good idea which patches of forest were cleared and which
12 were not if its not obvious from visiting these areas. We have an image of
13 the northwest field from the 1950s which indicates there was some intact
14 forest in the project area during that time period. If you have images from
15 the 60s, 70s, and 80s it might be possible to use them to narrow the search
16 effort a bit since some of these forest areas may have been cleared after
17 the 50s.

18
19 4. Candidate Snails - The Guam tree snail (*Partula radiolata*), humped tree
20 snail (*Partula gibba*), and fragile tree snail (*Samoana fragilis*) are all
21 candidate snail species that may be in the project area. It sounds like
22 you'll be using the survey methodology used for the cargo drop zone project.
23 You may also want to talk with Barry Smith at the UOG Marine lab to see if
24 he has any suggestions since he is the expert on these species. I also think
25 DAWR will be working with Barry to have snail surveys done in northern Guam.
26 Maybe the snail surveys for this project could use the same methodology for
27 that effort.

28
29 5. Mariana Eight Spot Butterfly - The larvae of this species feeds on
30 *Procris pedunculata* and *Elatostema calcareum*. Both of these forest herbs
31 (Family Urticaceae) grow only on karst limestone, so they are probably not
32 in the project site. However, it would be good to note if they are present
33 or not during the vegetation sampling.

34
35 6. Other Listed Bird Species - I know you would note this anyway, but I
36 thought I would mention that all listed birds should be recorded during the
37 Mariana crow surveys (e.g., Guam rail, Guam white-eye, swiftlets, etc.). I
38 doubt you would ever see any of these species but it would be good say that
39 you at least looked for them in the project site.

40
41 Finally, since I mentioned the use of old aerial imagery in the Serianthes
42 survey I thought I would suggest that it would be good to include these
43 images in the biological assessment (if they are available). I noticed one
44 image from the 60s or 70s was used in the EA but it would be good include
45 images from each decade, if possible, in the BA since it would assist in
46 evaluating the value of the exisitng forest patches to listed species
47 conservation. For example, it is likely that a patch of forest that was
48 cleared in the 1950s but was not maintained or recleared subsequently would
49 be better quality habitat than an area that was cleared in the 1970s.

50
51 Thanks for seeking my input. Let me know if you have any questions or if
52 you need anything else.

53
54 Fred



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

In Reply Refer To:
1-2-2005-TA-373

SEP 30 2005

Lt. Col. Marvin W. Smith, Jr.
Department of the Air Force
36th Civil Engineer Squadron
Unit 14007
APO AP 96543 - 4007

Dear Lt. Col. Smith:

Thank you for your August 25, 2005, letter regarding consultation under section 7 of the Endangered Species Act (ESA) for the proposed construction of facilities and utilities to support the training and basing of associated personnel at Northwest Field (NWF), Andersen Air Force Base (AAFB). We received your letter on August 30, 2005. We understand that a letter from the Air Force, Pacific Air Forces (PACAF), dated March 22, 2005, stating that the Air Force would like to pursue ESA section 7 consultation for the above proposed actions was sent to our office. Unfortunately, we have no record of having received the March 22, 2005 letter, although a copy of the letter was sent as an attachment to the August 25, 2005 letter, along with a map of the proposed beddown sites and the report entitled *Field Studies Survey Report Vegetation Community Mapping AAFB, Guam*.

In a September 28, 2005 meeting with me, my staff, and staff from PACAF, we discussed general issues related to currently proposed projects on Andersen Air Force Base. One immediate outcome of the meeting was an effort to clarify the intent of your August 25, 2005 letter. Although the original intent of the August 25, 2005, letter may have been to provide additional information on the proposed construction of facilities and utilities to support the training and basing of associated personnel at NWF-AAFB, PACAF also recognized the ambiguity in the aforementioned letter because it also mentions AAFB expansion associated with the increased presence of aircraft on the main base (also referred to in other documents as the "Global Strike Task Force"). As conveyed to Leilani Takano of my staff in a follow-up phone conversation on September 30, 2005 with him, Mark Ingoglia of PACAF discussed this question with others at PACAF and determined that our response should address both proposed projects. Therefore, this letter provides technical assistance with regard to compliance with section 7 of the ESA for both of the proposed projects.

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IN AMERICA 

AAFB contains habitat identified as essential to the recovery of the endangered Guam Micronesian kingfisher (*Halycon cinnamomina cinnamomina*), endangered Guam rail (*Gallinulus owstoni*), Mariana crow, and Mariana fruit bat (U.S. Fish and Wildlife Service 1990, 69 *Federal Register* 62944). The endangered Mariana crow (*Corvus kubaryi*) and the threatened Mariana fruit bat (*Pteropus mariannus mariannus*) are known to use the areas within AAFB for foraging and roosting. Also, the cooperative agreement between the U.S. Air Force and the U.S. Fish and Wildlife Service (Service) for the establishment and management of the Guam National Wildlife Refuge, Guam, dated March 10, 1994, states the Air Force will "provide for consultation... with the Service for actions that may impact habitat of endangered or threatened species even if those species are extirpated from the affected areas, but are not extinct." Therefore, we recommend that you analyze the possible impacts to all federally listed species and their habitat as a result of your proposed actions. We also encourage you to work with Guam Division of Aquatic and Wildlife Resources to obtain current territory locations for the endangered Mariana crow, as well as roosting and foraging locations for the Mariana fruit bat on AAFB.

With the proposed increase in AAFB construction, personnel, and training activities, military and civilian traffic via air and sea ports in support of AAFB activities is expected to increase. We are concerned that existing brown treesnake (*Boiga irregularis*) control, containment, and interdiction activities in support of AAFB are not adequate for dealing with current and anticipated increases in movement of cargo, personnel, and vehicles from Guam to other high risk destinations in the United States via military and civilian routes. Support for introduced brown treesnake control and interdiction on a base and logistical level must be commensurate with the risk associated with AAFB expansion (facility construction and additional personnel) and anticipated activities in the short and long term. Hawaii, Florida, the Gulf Coast of the United States, mild climate areas on the Western Coast of the U.S. (Southern Oregon to the Mexico border), and U.S. Territories and Possessions in the Pacific and Caribbean Oceans are considered high risk destinations due to climatic and ecological conditions within these areas that could support the establishment of brown treesnakes.

As you are aware, the accidental introduction of the brown treesnake to Guam is responsible for the extinction and extirpation of most of the island's native forest bird species. There may be some increased risk to other threatened and endangered species in high risk areas because of the proposed action. For example, in Hawaii, there are at least 30 endangered avian species and one endangered terrestrial mammal, the Hawaiian hoary bat (*Lasiurus cinereus semotus*) that may be affected if the brown treesnake established itself in the Hawaiian Islands. We request that you address brown treesnake interdiction issues and assess the current and future risk of brown treesnake dispersal and establishment to the aforementioned high risk sites as a result of your proposed actions. We recognize that this information may be challenging to obtain, staff from this office can assist you in acquiring data to conduct risk assessments and identify appropriate individuals who could conduct this risk assessment within the community that works on invasive species.

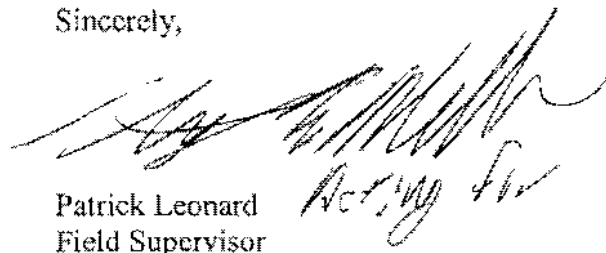
We have reviewed your enclosed *Field Studies Survey Report Vegetation Community Mapping AAFB, Guam*. The report lacks site-specific information we would need to help you determine potential impacts that the proposed projects may have on federally listed species and their

habitat. We recommend that areas within each of the proposed projects be adequately surveyed to include more detail on secondary limestone forest species composition and distribution. We also recommend you include information on the presence or absence of tree species determined to be important to the survival of the Mariana crow, Guam Micronesian kingfisher, Guam rail, and Mariana fruit bat per project area. We further recommend that you distinguish intact secondary growth limestone forest from secondary growth limestone forest that is dominated by alien vegetation such as tangantangan (*Leucaena leucocephala*) and invasive vines. In addition, please include an estimate of the amount of vegetation community type and specific tree species that will be cleared and/or disturbed by your proposed actions. Biologists in our office can provide technical assistance as needed, on sampling methods and the appropriate level of detail for plant surveys.

In your August 25, 2005, letter you requested our recommendation on whether to proceed with informal consultation or enter into formal consultation for the proposed projects. Currently, we do not have sufficient information about the scope and impacts of the proposed projects to federally listed species to assist you with your determination of the likely effects of the actions. To help us assist you in your determination of effects pursuant to ESA section 7, we request that you provide us with a detailed description of the proposed actions, including land use changes due to training activities; timing and duration of training activities; volume of military and civilian air and sea vehicles and cargo associated with expanded operations, construction, and staffing; and expected disturbance to vegetation from training and construction. Your effects determinations for these projects, along with our concurrence as appropriate, will determine whether informal or formal consultation is warranted for each project.

We appreciate your early coordination and commitment to the ESA section 7 consultation process for these proposed projects, and look forward to your response to our recommendations above. We will also continue to work with you and your staff to help you assess potential effects on federally listed species and carry out programs for their conservation. If you have any questions regarding our recommendations or the consultation process, please contact Leilani Takano, Fish and Wildlife Biologist, by phone 808/792-9400.

Sincerely,

A handwritten signature in black ink, appearing to read 'Patrick Leonard', is written over a printed name and title. The signature is stylized and cursive.

Patrick Leonard
Field Supervisor

cc:
DAWR, Guam
PACAF, Hawaii
USFWS NWR, Guam

1
2

APPENDIX B

CONSULTATION CONCERNING BROWN TREE SNAKE ISSUES

1

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ACQUISITION,
TECHNOLOGY
AND LOGISTICS

THE UNDER SECRETARY OF DEFENSE

3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

NOV 7 2005

The Honorable Neil Abercrombie
U.S. House of Representatives
Washington, DC 20510

Dear Representative Abercrombie:

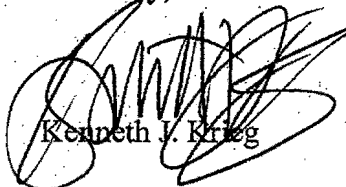
This is in response to your recent letter to the Secretary of Defense regarding the brown tree snake (BTS) problem on Guam and the recent incident involving a BTS found in a shipping container at McAlester Army Ammunition Plant in Oklahoma.

The Department of Defense (DoD) shares your concern and is striving to avoid spread of the BTS through US military operations. Over the past 12 years, DoD has worked closely with USDA-APHIS Wildlife Services (WS) to deter and control the BTS in Guam and to prevent the spread of the snake to other locations. We plan to increase and enhance our efforts to ensure 100% of all military cargo and carriers departing Guam are snake-free.

To ensure better coordination between DoD personnel in Guam and Hawaii with WS personnel, we are developing guidance for U.S. Transportation Command (USTRANSCOM), as well as the Departments of the Navy and Air Force, stressing that all DoD organizations involved in the movement of DoD-sponsored cargo are required to take steps necessary to prevent the spread of pests from one location to another. Upon completion, a copy of the guidance will be provided to your office.

The Department is committed to continue our work with federal, state and local government agencies to prevent the further spread of the BTS. We are providing Senators Inouye and Akaka and Representative Case this response by separate letters.

Sincerely,



Kenneth J. Krieg



DANIEL K. INOUE
HAWAII

APPROPRIATIONS
Subcommittee on Defense—Ranking Member

COMMERCE
Subcommittee on Surface Transportation and
Merchant Marine—Ranking Member

COMMITTEE ON INDIAN AFFAIRS

DEMOCRATIC STEERING AND COORDINATION
COMMITTEE

COMMITTEE ON RULES AND ADMINISTRATION

United States Senate

SUITE 722, HART SENATE OFFICE BUILDING
WASHINGTON, DC 20510-1102
(202) 224-3934
FAX (202) 224-6747

PRINCE KUHIO FEDERAL BUILDING
ROOM 7-212, 300 ALA MOANA BOULEVARD
HONOLULU, HI 96850-4975
(808) 541-2542
FAX (808) 541-2549

101 AUPUNI STREET, NO. 205
HILO, HI 96720
(808) 935-0844
FAX (808) 961-5163

November 17, 2005

**Mr. Scott Whittaker
Environmental Flight Chief
Unit 14007
APO AP 96543-4007**

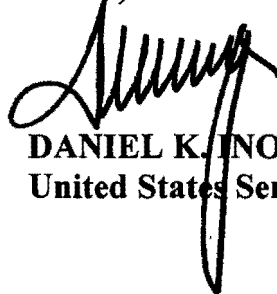
Dear Mr. Whittaker:

On September 26, 2005, the Hawaii Congressional Delegation sent the enclosed letter to Defense Secretary Donald Rumsfeld, regarding brown tree snake control and interdiction on Department of Defense facilities on Guam. Accordingly, within applicable rules and regulations, I request that the Delegation's letter be included in the record of comments for the following environmental review processes associated with expansion activities at Andersen Air Force Base:

- 1. Draft Environmental Impact Statement for Global Strike Task Force, Anderson AFB, Guam; and**
- 2. Draft Environmental Assessment for Beddown of Training and Support Initiatives at Northwest Field, Andersen AFB, Guam.**

Thank you for your assistance in this matter.

Aloha,



**DANIEL K. INOUE
United States Senator**

**DKI:mcb
Enclosure**

United States Senate

WASHINGTON, DC 20510

September 26, 2005

**The Honorable Donald Rumsfeld
Secretary
Department of Defense
1000 Defense Pentagon
Washington, D.C. 20301-1000**

Dear Mr. Secretary:

On September 12, 2005, a live brown tree snake (BTS) was discovered at the McAlester Army Ammunition Plant in Oklahoma. The snake had survived in an unpacked shipping container from Guam for more than a month. We are very fearful that the snake found at McAlester will not be an isolated occurrence since in the last 12 months, 150 military aircraft and more than 1.8 million pounds of military cargo left Guam without being inspected for BTS. This is especially alarming since establishment of the BTS in our state would be devastating to our natural environment and the many threatened and endangered species in Hawaii's unique ecosystem. Further, if this invasive alien species found a home in Hawaii, experts estimate the economic impacts to Hawaii's visitor and agriculture industries and from electrical power interruptions will exponentially outweigh the cost of preventing its arrival in the first place.

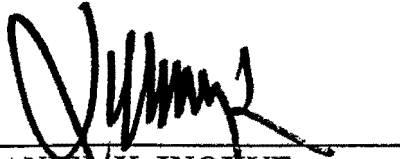
We appreciate the Department of Defense's (DOD) response to our communication last year and the additional funding provided in Fiscal Year 2005. Unfortunately, direct and indirect support for BTS control and interdiction on DOD facilities on Guam continues to fluctuate. We believe that a program will only be effective if all federal, state, and local government agencies work collaboratively toward this goal. We all share in the responsibility of preventing the movement of pests that are harmful to the U.S. economy, environment, and human health. With this in mind, we write to urge your continued cooperation with the U.S. Department of Agriculture-Wildlife Services (WS) and other federal agencies conducting BTS interdiction, control and research. While we realize that financial resources at all levels of the federal government are stretched thin, we ask your continued support for this important responsibility. More specifically, we ask your assistance in ensuring your commands in Guam provide federal BTS inspectors as much notice as possible of scheduled and unscheduled packing and departures, as well as suitable on-base facilities for WS and other federal personnel, equipment and canines to stage BTS inspection, control, and interdiction operations.

The Honorable Donald Rumsfeld

September 26, 2005

Page 2

Thank you for your assistance on this important matter. We look forward to your reply.



DANIEL K. INOUE
United States Senator

Sincerely,



DANIEL K. AKAKA
United States Senator



NEIL ABERCROMBIE
Member of Congress



ED CASE
Member of Congress



ACQUISITION,
TECHNOLOGY
AND LOGISTICS

THE UNDER SECRETARY OF DEFENSE

3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

NOV 7 2005

The Honorable Daniel K. Inouye
U.S. Senate
Washington, DC 20510

Dear Senator Inouye:

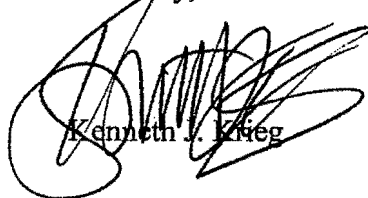
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The Department of Defense (DoD) shares your concern and is striving to avoid spread of the BTS through US military operations. Over the past 12 years, DoD has worked closely with USDA-APHIS Wildlife Services (WS) to deter and control the BTS in Guam and to prevent the spread of the snake to other locations. We plan to increase and enhance our efforts to ensure 100% of all military cargo and carriers departing Guam are snake-free.

To ensure better coordination between DoD personnel in Guam and Hawaii with WS personnel, we are developing guidance for U.S. Transportation Command (USTRANSCOM), as well as the Departments of the Navy and Air Force, stressing that all DoD organizations involved in the movement of DoD-sponsored cargo are required to take steps necessary to prevent the spread of pests from one location to another. Upon completion, a copy of the guidance will be provided to your office.

The Department is committed to continue our work with federal, state and local government agencies to prevent the further spread of the BTS. We are providing Senator Akaka and Representatives Abercrombie and Case this response by separate letters.

Sincerely,



Kenneth J. Feltg





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AND LOGISTICS

THE UNDER SECRETARY OF DEFENSE

3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

NOV 7 2005

The Honorable Ed Case
U.S. House of Representatives
Washington, DC 20510

Dear Representative Case:

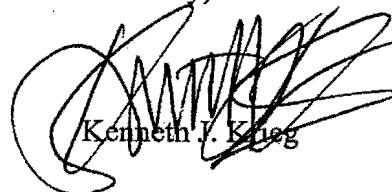
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The Department is committed to continue our work with federal, state and local government agencies to prevent the further spread of the BTS. We are providing Senators Inouye and Akaka and Representative Abercrombie this response by separate letters.

Sincerely,



Kenneth J. Krueg





ACQUISITION,
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AND LOGISTICS

THE UNDER SECRETARY OF DEFENSE

3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

The Honorable Daniel K. Akaka
U.S. House Senate
Washington, DC 20510

Dear Senator Akaka:

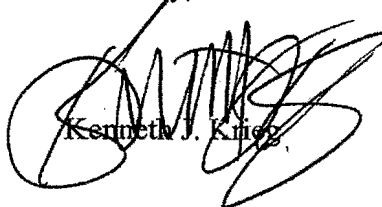
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The Department is committed to continue our work with federal, state and local government agencies to prevent the further spread of the BTS. We are providing Senator Inouye and Representatives Abercrombie and Case this response by separate letters.

Sincerely,



Kenneth J. Knipe



LINDA LINGLE
Governor



SANDRA LEE KUNIMOTO
Chairperson, Board of Agriculture

DUANE K. OKAMOTO
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii 96814-2512
Phone: (808) 973-9600 Fax: (808) 973-9613

November 15, 2005

Mr. Scott Whittaker
Environmental Flight Chief
Attn: GSTF Stakeholder Survey
Unit 14007
APO, AP 96543

Dear Mr. Whittaker:

This is in response to your letter dated October 5, 2005 regarding the proposal to base a Global Strike Task Force (GSTF) on Andersen Air Force Base, Guam. We understand this would mean the addition of 3,000 military, civilian, and contractor personnel and dependents. The project is scheduled to begin in 2007, with completion in 2016.

There are several concerns such a project would raise in Hawaii. Currently, the United States Department of Agriculture-Wildlife Services (USDA-WS) on Guam is responsible for the inspection of outbound aircraft and cargo, both military and civilian. It is our understanding that due to the existing workload and the amount of personnel and funds they have available to carry out their mission, they are stretched to the limit. Presently, they are unable to inspect and screen all aircraft and cargo that is bound for Hawaii from Guam. We do not believe that USDA-WS will be able to adequately provide the coverage needed to meet the expansion of personnel, aircraft, and cargo that would be a result of the basing of the GSTF at Anderson AFB.

For the State of Hawaii, the first line of defense for keeping the brown tree snake out is on Guam. It is in Hawaii's best interest that USDA-WS be able to secure additional funding to meet this proposed expansion of the military on Guam. This could be either through the United States Department of Interior, Office of Insular Affairs (OIA), or through the military (DOD).

It is unknown how many additional military flights/ships Hawaii would receive with the basing of the GSTF. In FY 2005, the inspectors of the Hawaii Detector Dog program inspected 675 of 704 military aircraft/ship arrivals from Guam, Northern Australia, and Saipan. The program is scheduled to gain two general funded positions

Mr. Scott Whittaker
November 15, 2005
Page 2

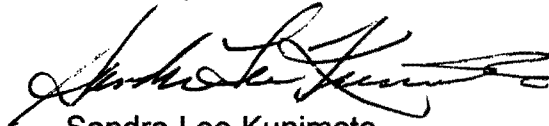
in the near future expanding the unit to six canine teams (three permanent and three OIA funded temporary positions). However, we are unsure if the additional staffing will prove to be adequate given the proposed basing and increase in flights and ships.

Personnel costs for the inspectors continue to rise, which the OIA grant will have difficulty keeping up with due to other programs, e.g. Guam and Saipan, competing for grant funds. Personnel turnover is high among the temporary positions.

All of these factors cause us to be concerned about Hawaii's and USDA-WS's ability to respond to increased military and civilian traffic resulting from the basing of the GSTF.

Thank you very much for the opportunity to send in our written comments concerning the GSTF.

Sincerely,

A handwritten signature in black ink, appearing to read 'Sandra Lee Kunimoto', with a stylized flourish at the end.

Sandra Lee Kunimoto
Chairperson, Board of Agriculture

APPENDIX C ANDERSEN AFB BROWN TREE SNAKE CONTROL PLAN

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COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

36WGI32-7004

BY ORDER OF THE COMMANDER, 36TH WING

36 WG INSTRUCTION 32-7004

DATE: 15 March 2006

Civil Engineering

BROWN TREE SNAKE MANAGEMENT

OPR: 36 CES/CES (Jonathan Wald)

Certified by: 36 CES/DCE (Merlin J. Miller)

Pages: 16/Distribution: F

This instruction implements the **Brown Tree Snake Control Plan** prepared under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, the **Brown Tree Snake (BTS) Control and Interdiction Plan (COMNAVMARIANAS INSTRUCTION 5090.10)** dated June 2000, and the **Brown Tree Snake Control and Eradication Act of 2004** (Public Law 108-384, 108th Congress). The purpose of this instruction is to establish procedures and guidelines to prevent the spread of Brown Tree Snake (BTS) to areas where it is not already established via the AAFB transportation network. It outlines the procedures for cooperative interagency efforts to control and interdict BTS, including Department of Defense (DoD) coordination, support, and documentation of inspections of outgoing aircraft and cargo by United States Department of Agriculture Wildlife Services (USDA WS) personnel. This instruction applies to all personnel assigned, attached, or associated with the 36th Wing (36 WG), its tenant units, and contractors. This publication also applies to US Air Force Reserve and Air National Guard units and other organizations/tenants associated with or residing on Andersen AFB.

Chapter 1

PROGRAM REQUIREMENTS

1.1. Purpose of Program. Brown Tree Snake (BTS) control and interdiction efforts on Andersen are aimed at reducing the risk of dispersal of the BTS, an invasive species causing extensive damage to Guam's ecology, from Guam via the base's transportation network, as well as addressing ongoing and potential BTS threats to biological resources and human health and safety.

1.2. General Roles and Responsibilities. A Memorandum of Agreement, signed by the United States Departments of Defense, Interior, Agriculture, and Transportation, as well as the State of Hawaii, the Government of Guam, and the Commonwealth of the Northern Marianas Islands,

establishes the cooperative relationship between all signatories in administering BTS control and research activities.

1.2.1. Interdiction Program Requirements. All shipments by air or sea of material originating from Andersen AFB facilities for military exercise support, day-to-day military cargo and equipment and private contractors will be inspected by USDA WS personnel and/or their trained snake detection canines and properly document the inspection before transport off-island. All aircraft, military or civilian, taking off from Andersen AFB will be inspected by USDA WS to the maximum extent possible.

1.2.2. Oversight. 36 CES/CEV will designate a BTS Management Liaison responsible for administering the program outlined in this instruction and resolving any issues dealing with BTS management on Andersen AFB.

1.2.3. Role of U.S. Department of Agriculture Wildlife Service. Control and interdiction protocols will be practiced on a daily basis by private sector contractors and military organizations and/or personnel from Guam's USDA WS, which is the primary federal agency responsible for ensuring the BTS does not leave the island of Guam. USDA WS works cooperatively with the Department of Defense to implement proactive control measures aimed at preventing BTS dispersal.

1.2.3.1. All aircraft and cargo destined for off-island locations have a 100% requirement for BTS inspection. USDA WS personnel require a minimum of 2 hours' notice for inspections and will have detector canine teams available 24/7.

1.2.4. Role of Department of Defense. Andersen personnel involved with military training exercises, operational requirements, private contractors and BTS control/interdiction programs will:

1.2.4.1. Plan, direct, and coordinate all cargo handling procedures for cargo departing Guam with consideration for the on-going threat to the Pacific spread of BTS. Cargo handlers and/or managers will work closely with USDA WS personnel to establish and maintain effective cargo and equipment BTS inspection processes. The agency responsible for the BTS inspection or staging area will coordinate for and provide area lighting when needed.

1.2.4.2. Fully cooperate with USDA WS to conduct measures necessary to reduce the BTS snake population at port and cargo facilities through an integrated approach consisting of technical assistance and lethal and non-lethal control methods such as prey base reduction, exclusion, habitat modification, and capture.

1.2.4.3. Provide USDA WS with adequate forward notification of cargo movements that are not part of typical daily operations, as outlined in the corresponding chapters of this instruction, and assist them as necessary to facilitate the timely completion of the mandatory inspection process.

1.2.4.4. As part of major exercise planning, address BTS control and interdiction procedures in the exercise plan's AF Form 813, Request for Environmental Impact Analysis, in consultation with USDA WS.

1.2.5. Education and Awareness Requirements. The 36 CES/CEV BTS Management Liaison will coordinate closely with USDA WS to obtain and disseminate materials related to BTS education and awareness. Units involved with military training exercises, operational requirements, private contractors and BTS control/interdiction programs at Andersen will:

1.2.5.1. Publish and distribute the BTS Emergency Response Protocol. Prominently display contact information and telephone numbers to report BTS sightings (Attachment 1).

1.2.5.2. Conduct information briefings for both permanently assigned and transient personnel based on materials provided by 36 CES/CEV and USDA WS. Explain the potential for impacts if BTS were transported from Guam in military vehicles, cargo and equipment. Explain individual responsibilities if and when a BTS is sighted (kill/capture/immediately report to USDA WS). Use the BTS Awareness instructional videotapes and printed materials, requesting USDA WS participation and/or demonstrations at the briefings when their workloads permit.

1.2.5.3. Provide information cards to personnel as a reminder of the threat and responsibilities for immediate action.

1.2.5.4. Clearly display BTS identification and information posters in tent cities, dormitories, and work sites.

Chapter 2

OUTBOUND AIRCRAFT INSPECTION PROCEDURES

2.1. Requirements. Aircraft departing for off-island destinations are required to undergo 100% BTS inspections by USDA WS personnel with detector canines. USDA WS requires a minimum of 2 hours' notice in order to conduct an aircraft inspection.

2.2. Exemptions. Aircraft flying local missions that are not scheduled to land off-island are exempt from USDA WS inspection.

2.2.1. Since the BTS is nocturnal, quick-turn aircraft that remain on the ground less than 3 hours during daylight do not require BTS inspection.

2.2.2. Commercial aircraft that remain on the ground less than 3 hours during night time (any time on the ground between official sunset and sunrise) will undergo a visual BTS inspection. Commercial aircraft remaining longer than 3 hours will be prepared for a canine inspection. If a canine inspection occurs, the APU's on commercial aircraft will be off.

2.2.3. Urgent missions, such as MEDEVAC, will not be delayed in order to accomplish a BTS inspection. However, every effort will be made to conduct inspections on these aircraft prior to their scheduled departures.

2.3. Incoming Aircrew Notifications. 36 OSS will publish the following notification of BTS inspection requirements in the appropriate Flight Information Publications: "All aircraft departing Andersen AFB are required to have a brown tree snake inspection conducted by USDA WS. Changes in scheduled departure times require three hours' prior notice to ensure timely accomplishment of this inspection."

2.3.1. 36 OSS will require military aircrews with off-island destinations to file their flight plans no later than 3 hours prior to the desired departure time in order to provide enough response time to the USDA WS.

2.3.2. 36 OSS will relay BTS inspection requirements to deployed units during the "Local Area Knowledge" briefing.

2.4. USDA Notifications. Airfield Management (36 OSS/OSAM) will make a printed copy of the consolidated daily flying schedule available to USDA WS no later than 0600 each day. Failure to provide more than 2 hours' notification may result in a stop movement until an inspection can be conducted.

2.4.1. The 734th AMS is responsible for notifying USDA WS of changes to the daily flying schedule for any of the AMC controlled assets. This notification will be made as soon as possible after learning of the proposed change.

2.4.2. The 36 WG Command Post is responsible for notifying USDA WS of changes to the daily flying schedule for any non-AMC controlled assets. This notification will be made as soon as possible after learning of the proposed change.

2.4.3. HSC-25 will coordinate directly with USDA WS to ensure their aircraft with off-island destinations inspected prior to departure.

2.4.4. The 36 OSS will ensure that aircraft inspections are documented in the Access Database upon receipt of an outbound flight-plan. If no inspection is indicated, 36 OSS will coordinate with USDA WS to get the inspection completed. Every effort will be made to avoid departure delays.

2.5. Documentation Requirements. USDA WS will notify 36 WG Command Post upon completion of each aircraft inspection. 36 WG Command Post will annotate completed inspections in the Access database, annotating the entry with the initials or name of the USDA WS personnel making the notification.

2.5.1. Database Access. The Access database will be visible to authorized users within the 36 WG Command Post, 36 OSS, Expeditionary Bomb Squadron, Tanker Task Force, and 734th AMS. USDA WS will be provided information from the database upon request to any authorized user.

2.6. Authority to Stop Movement. The installation Commander has delegated authority to 36 OSS, upon a request by USDA WS made either directly or via the 36 WG Command Post, to stop any aircraft from departing Guam that has not been inspected and/or is suspected to harbor BTS.

2.6.1. The 36 OSS personnel who direct the stop movement will inform the 36 OSS/CC or his designated representative. The 36 OSS/CC or his designated representative will ensure 36 EOG/CC is briefed on the incident.

2.7. Aircraft departing without inspection. If an aircraft departs without having a BTS inspection accomplished, USDA WS will contact the appropriate agencies at its destination and inform them.

2.7.1. The 36 WG Command Post will inform the 36 OSS/CC or his designated representative if any aircraft has departed without the appropriate BTS inspection. The 36 OSS/CC or his designated representative will ensure wing leadership is briefed on the incident.

Chapter 3

AERIAL PORT CARGO INSPECTION PROCEDURES

3.1. General Responsibilities and Requirements. Outbound aerial shipments from Andersen include general freight, household goods, and unaccompanied baggage.

3.1.1. The 734th Air Mobility Squadron (AMS) on AAFB handles all outgoing air freight. Containers are delivered to the 734 AMS warehouse area, where they are then palletized, processed, and eventually loaded onto aircraft.

3.2. Routine cargo inspections. Inspections of outgoing air cargo are conducted at the 734 AMS warehouse area.

3.2.1. 734 AMS personnel will inspect all originating boxes for holes, punctures, damage and/or cracks that may permit BTS access and inspect all shipments throughout the selection, palletizing, building and loading process. 734 AMS personnel will handle and stack each sealed box individually while building up pallets.

3.2.1.1. 734 AMS will ensure all personnel receive initial in-depth training on procedures to follow upon spotting a BTS and coordinate with WS for periodic follow-up BTS awareness training sessions. Personnel will remain alert for BTS signs or opportunities at all times.

3.2.2. USDA WS will perform routine sweeps of the 734 AMS warehouse and cargo yard grid three times daily, M-F, and twice daily, Sat-Sun, and maintain a log book in the dispatch area that details their inspection dates and times.

3.3 USDA Notifications. 734 AMS load planners will notify USDA WS when load plans are complete, approximately 4-6 hours before departure. Notification will be either in person if USDA WS personnel are present or by phone when necessary.

3.4. Documentation Requirements. The 734 load planner will annotate the load plan with the time and name of the person notified. Upon completion of the inspection, USDA WS will notify 36 WG Command Post. 36 WG Command Post will update the central inspection database accordingly.

3.5 Authority to Stop Movement. The installation Commander has delegated authority to 36 OSS Commander or his designated representative, upon a request by USDA WS made either directly or via the ATOC, to stop any aircraft from departing Guam with any cargo or equipment that has not been inspected and/or is suspected to harbor BTS. 734 AMS ATOC personnel should notify USDA WS and 36 OSS Airfield Management if cargo about to be loaded onto an aircraft or vehicle has not undergone the appropriate BTS inspection.

Chapter 4

MUNITIONS SHIPMENT INSPECTIONS

4.1. Requirements. Munitions movements typically consist of either break-bulk/uncontainerized or International Organization for Standardization (ISO) container movements that are transported to Kilo Wharf on COMNAVMARIANAS, or those which are loaded directly onto aircraft at Andersen AFB. MUNS will schedule BTS inspections through USDA WS in order to better coordinate any munitions activities going on the same day.

4.2. Break-bulk/uncontainerized munitions:

4.2.1. Munitions pallets will be staged in an area conducive to USDA WS BTS inspections prior to on loading onto trailers for transport to Kilo Wharf.

4.2.2. USDA WS canine inspections will be conducted on the munitions while at the staging area before they are loaded.

4.2.3. Munitions will not be loaded on trailers which are not ready for immediate transport (within the same day). Munitions that have been exposed to the environment (not sealed in containers) overnight must be re-inspected by USDA WS prior to transport.

4.3. ISO containers:

4.3.1. Munitions will be staged in an area conducive to USDA WS BTS inspections prior to loading into the containers.

4.3.2. USDA WS canine inspections will be conducted on the munitions while at the staging area before they are loaded into the containers.

4.3.3. Containers not fully loaded, which are to be left unattended overnight, will be sealed after the last USDA WS BTS inspected munitions are loaded into the ISO container. All munitions that were not sealed in containers overnight must be inspected before loading continues on the following day.

4.3.4. Munitions destined for movement via aircraft will be coordinated through the 734 AMS and USDA WS for the BTS inspection prior to loading.

4.4. USDA Notifications. 36 MUNS will attempt to provide an estimated shipping date to USDA a minimum of 30 days out, for most large munitions shipments (i.e. Turbo CADS). Given that this projected date will be tentative, USDA WS will request further updates from MUNS, who will provide a firm target date for all munitions shipments at least 7 days in advance (unless MUNS receives less notice, in which case they will notify USDA WS immediately after learning of the short-notice shipment) and a minimum of 3 hours' notice for any inspections desired on that date.

4.5. Documentation Requirements. 36 MUNS personnel will make an entry in the BTS log located in the crew chief book that identifies the USDA WS inspector for that day's shipment and the approximate time the inspection was conducted, which will then be initialed by the handler conducting the inspection. Before the close of each day in which USDA WS has inspected munitions, USDA WS will coordinate with 36 MUNS to schedule an end-of-day verification of loaded munitions status. At the end of each day, 36 MUNS will make an entry in the BTS log located in the crew chief book verifying that all containers containing munitions packed for shipment have been closed prior to darkness, and the approximate time those containers were closed; USDA WS will authenticate this entry by initialing it.

Chapter 5

TMO SHIPMENTS

5.1. Requirements. Containerized household goods and unaccompanied baggage shipments for Air Force personnel and DOD civilians departing from Andersen AFB, as well as other items scheduled to leave Guam via surface vessel, are managed by Andersen's Transportation Management Office (TMO). When items are shipped by surface vessel, only those containerized prior to transportation to the waterport are addressed by this instruction.

5.1.2. The packing and loading of all household goods at Andersen, including unaccompanied baggage, is accomplished by carriers/local agents before the goods are surface-transported to the port for shipping. USDA WS will promote BTS education and training to local agent/carrier employees.

5.1.3. Items that are of greatest concern are those that have been stored outdoors or in carports and sheds, such as washers, dryers, swing set tubing, lawnmowers, barbeque grills, lumber, pipes, garden hoses, and vehicles. Personnel will be briefed by the TMO that USDA WS will be at the residence to inspect for the presence of BTS.

5.2. Prioritization. Although USDA WS will make every reasonable effort to perform HHG inspections, since HHG are packed at several geographically separated locations simultaneously, USDA WS will prioritize inspections based upon a risk analysis, conducting daily inspections on shipments deemed to pose the largest risk first. Risk factors they consider include packout location, shipment size (shipments of less than 4,000 pounds present a negligible risk), destination (Hawaii and Diego Garcia have the highest priority), and contents (large quantities of goods and equipment stored outdoors carries a higher risk).

5.3. USDA Notifications. TMO will provide USDA WS with a schedule of the upcoming week's HHG packouts and any other container movements every Friday; in addition, they will provide a detailed schedule every day by COB that identifies the type of shipment, carrier, and estimated weight for each of the next day's packouts and container movements.

5.4. Documentation Requirements. USDA WS will make a copy of the weekly schedule and annotate each shipment that was inspected with the inspector's name or initials. USD WS will provide this documentation to TMO ten (10) days later (the following Monday). TMO will maintain these documents on file for at least one year after completion.

5.5. Outbound Privately Owned Vehicles. A significant component of the PCS movement process, personally-owned vehicles (POVs) are handled through a single facility at COMNAVMARIANAS. Vehicles departing Guam are not inspected at Andersen.

5.5.1. USDA WS will conduct canine inspections daily (Monday-Friday) on outbound vehicles at the COMNAVMARIANAS POV lot before being packed directly into 20' or 40' containers and trucked to the Commercial Port for loading onboard a civilian cargo ship. If a vehicle is

inspected but not loaded prior to the close of business on a given day, USDA WS will conduct a follow-up inspection the next business day.

Chapter 6

HSC-25 AIRCRAFT INSPECTION PROCEDURES

6.1. Requirements. Since the BTS is nocturnal; maintenance personnel are present on the flight line in large numbers during the daytime; and pre-flight visual inspections are conducted; a morning inspection of HSC-25 aircraft by USDA WS is considered valid for all flights that take off during daylight hours that same day.

6.1.1. USDA WS inspections of HSC-25 aircraft will be conducted daily prior to the beginning of each day's scheduled flights. To the maximum extent possible, inspections will be conducted at a regular, recurring time as agreed upon by HSC-25 and USDA WS. To ensure timeliness and efficiency, only those aircraft identified by HSC-25 Maintenance Control as viable for flight operations will be inspected. The inspection time will be pre-coordinated between HSC-25 and USDA WS personnel and an HSC-25 Plane Captain will accompany the USDA WS inspector during the inspection to ensure the safety of all personnel and aircraft inspection integrity.

6.1.2. During pre- and post-flight inspections, the inspection of all bays and access panels will include a visual check for potential BTS. In addition, maintenance personnel who are servicing aircraft, conducting daily inspections, and troubleshooting maintenance discrepancies will remain vigilant for BTS incursion. At the completion of daily maintenance, maintenance personnel will ensure all intakes are plugged and all door/panels are secured, which should greatly reduce the possibility of nighttime BTS entry.

6.2. Exemptions. Any aircraft flying missions that are not scheduled to touch down off-island are exempt from USDA WS inspection.

6.2.1. Emergency response exemption. Since delaying an immediate launch for SAR or MEDEVAC is potentially life-threatening to the victim(s), HSC-25 will not delay such missions in order to be inspected. HSC-25 is responsible for informing USDA WS of the short-notice mission upon receipt; if the inspection is not conducted, USDA WS is responsible for making any notification to agencies they deem applicable at the intended destination.

6.3. USDA Notifications. HSC-25 will provide USDA WS a Flight Schedule the evening prior to each Fly Day. The Flight Schedule will annotate the BTS Inspection Time as coordinated between HSC-25 and USDA WS, as well as any known missions that will require HSC-25 to put wheels down anywhere other than Guam soil.


6.3.1. HSC-25 will notify USDA WS of any changes to this schedule when they involve an aircraft taking off during the hours of darkness, at the earliest opportunity once HSC-25 is aware of the change. HSC-25 will also notify USDA WS of any short-notice/emergency flights that would normally require inspection as soon as feasible, but will not delay an emergency response in order to receive an inspection.

6.3.1. Cargo Inspection Notifications. HSC-25 routinely moves cargo for NSWU-1, EODMU-5 and MSS-7, as well as MSC and AF SFS. Any unit transporting cargo via HSC-25 is responsible for clearing their own cargo through USDA WS prior to it being transported to or by HSC-25.

6.3.2. HSC-25 will inform units making requests for cargo transportation of the USDA WS inspection requirement. Units are responsible for notifying USDA WS of the cargo location and estimated pickup time NLT 3 hours prior to the intended pickup time.

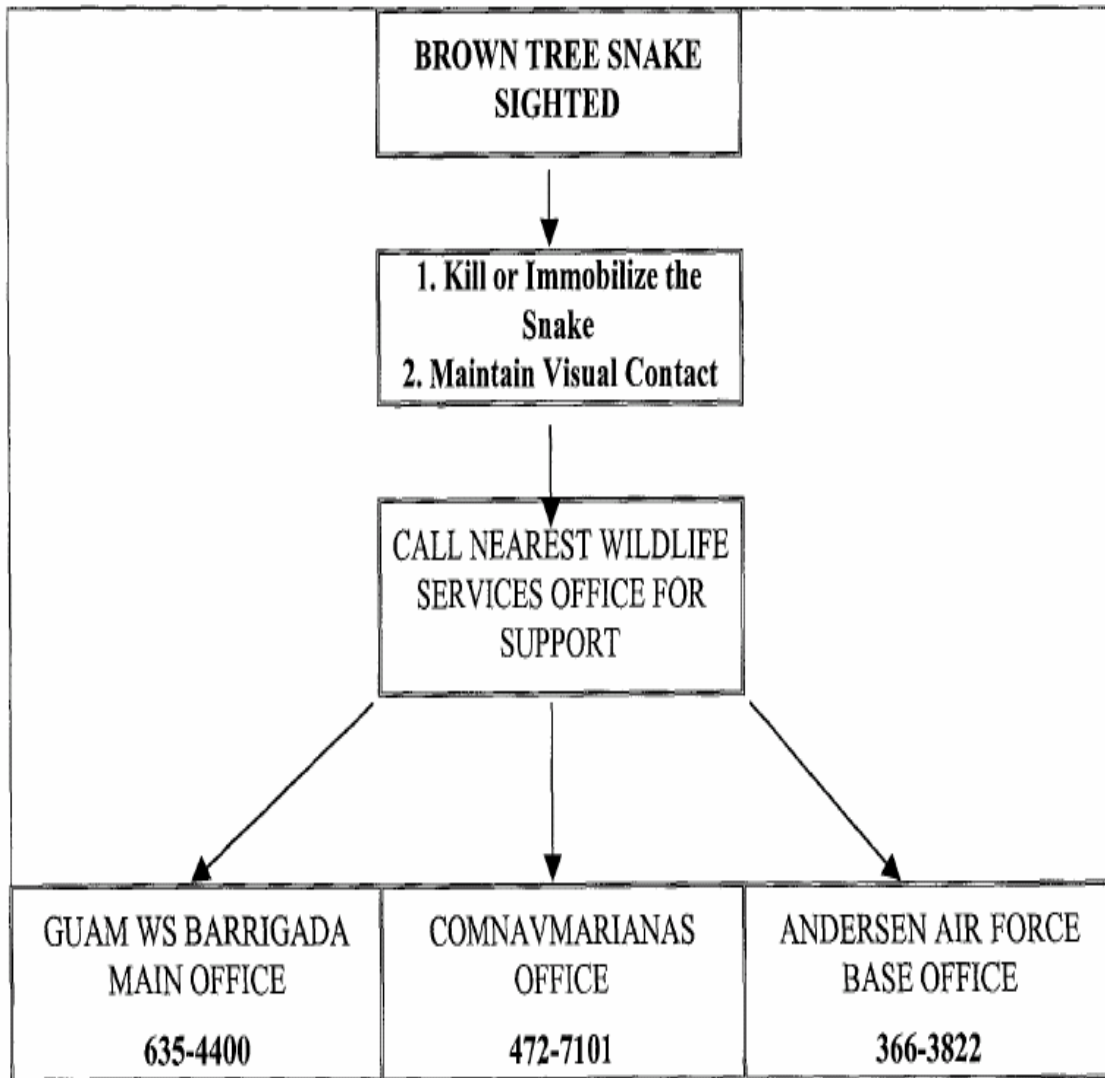
6.3.3. HSC-25 will also brief USDA WS inspectors of any known cargo transport missions during their morning inspection, to assist USDA WS in making arrangements for an inspection with the unit that owns the cargo.

6.4. Documentation Requirements. USDA WS will notify 36 WG Command Post upon completion of HSC-25 aircraft inspections, using the tail numbers of inspected aircraft as a reference. 36 WG Command Post will annotate completed inspections in the Access database, annotating the entry with the initials of the USDA WS personnel making the notification.

A handwritten signature in black ink, appearing to read 'Mike Boera', with a stylized, cursive script.

MICHAEL R. BOERA, Col, USAF
Commander, 36th Wing

Table 1: BTS Emergency Response Procedures



* This chart refers to brown tree snakes found in cargo and cargo or flightline areas only. If brown tree snakes are found in residential areas there is no need for residents to notify Wildlife Services. Residents can just kill and dispose of the snake.

Attachment 2. BTS Inspection Contact Information.

Subject: USDA Canine Inspection Contact Phone Numbers

Date: March 15, 2006

To: All Cooperators

USDA-Wildlife Services canine inspection hours and contact telephone numbers are listed below. Please take note of the different telephone numbers for locations north and south of the village of Hagatna.

MONDAY-FRIDAY

	<u>North of Hagatna</u>	<u>South of Hagatna</u>
2200 – 0530 hrs:	888-5708	888-5706
0530 – 2200 hrs:	888-5707	888-5705

SATURDAY-SUNDAY

Call 888-5705 or 888-5709 regardless of location.

If no message can be left at the phone numbers listed above, please try to contact our Andersen AFB Team Leader at 888-5713, or Navy Team Leader at 888-5727 to schedule an inspection.

If you have any questions or concerns in regards to this memo, please feel free to contact me at Andersen AFB at 366-3822.

Sincerely,

Jason C. Gibbons
Supervisory Wildlife Biologist
Canine Program Manager, Acting
USDA/ APHIS/Wildlife Services, Guam

APPENDIX D AIRCRAFT NOISE

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AIRCRAFT NOISE MODELING

This appendix contains information on the noise modeling accomplished for use in the effects determination in this biological assessment (BA).

Noise Metrics

A “metric” is defined as something “of, involving, or used in measurement.” In environmental noise analyses, a metric refers to the unit or quantity that quantitatively measures the effect of noise on the environment. Noise studies typically involved a confusing proliferation of noise metrics as individual researchers attempted to understand and represent the effects of noise. As a result, available literature describing environmental noise abatement includes many different metrics.

Various federal agencies involved in environmental noise mitigation agree on common metrics for environmental impact analysis documents, and both the Department of Defense (DoD) and the Federal Aviation Administration (FAA) specified those which should be used for federal aviation noise assessments. These metrics are as follows.

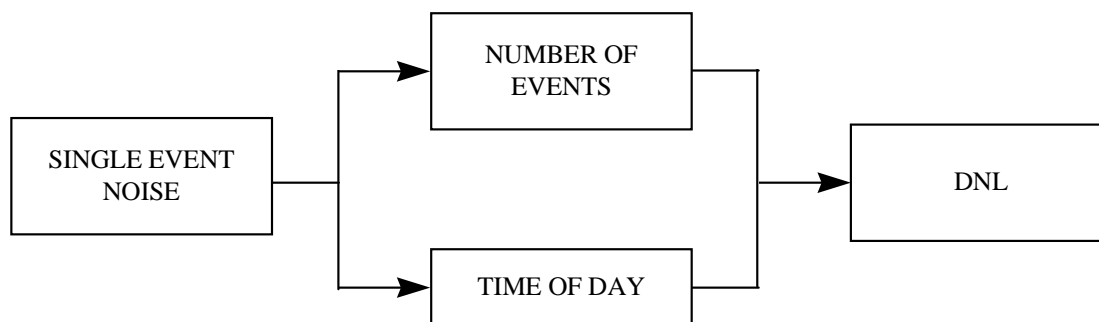
Maximum Sound Levels

The highest A-weighted sound level measured during a single event in which the sound level changes value as time goes on (*e.g.*, an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level, for short. It is usually abbreviated ALM, L_{\max} , or $L_{A\max}$.

Averaged Noise Metrics

Single event analysis has a major shortcoming -- single event metrics do not describe the overall noise environment. DNL is the measure of the total noise environment. DNL averages the sum of all aircraft noise producing events over a 24-hour period, with a 10 dBA upward adjustment added to the nighttime events (between 10:00 p.m. and 7:00 a.m.). Figure D-1 depicts the relationship of the single event, the number of events, the time of day, and DNL. This adjustment is an effort to account for increased human sensitivity to nighttime noise events. The summing of sound during a 24-hour period does not ignore the louder single event; it actually tends to emphasize both the sound level and number of those events. The logarithmic nature of the dB unit causes sound levels of the loudest events to control the 24-hour average.

Figure D-1 Day-Night Average A-Weighted Sound Level



Noise Modeling

NOISEMAP noise model, version 7.296, was used to develop the noise contours and DNL values from airfield operations for this BA. Maximum sound level noise used in this BA was calculated by using the Flyover Noise Calculator (USAF 2002).

NOISEMAP is a suite of computer programs developed by the Air Force to predict noise exposure in the vicinity of an airfield due to aircraft flight, maintenance, and ground run-up operations. Data describing flight tracks and flight profile use, power settings, ground run-up information by type of aircraft/engine, and meteorological variables are assembled and processed for input into NOISEMAP. The model uses this information to calculate DNL values at points on a regularly spaced grid surrounding the airfield. A plotting program generates contour lines connecting points of equal DNL values in a manner similar to elevation contours shown on topographic maps. Contours are generated as 5 dB intervals beginning at DNL 65 dBA, the maximum level considered acceptable for unrestricted residential use. The contours produced by NOISEMAP are used in the effects determination in this BA. While there is no technical reason why a lower level cannot be measured or calculated for comparison purposes, DNL 65 dBA:

- has been adopted by the DoD, U.S. Environmental Protection Agency, FAA, and Department of Housing and Urban Development as the threshold for comparing and assessing community noise effects;
- is often used to determine residential land use compatibility around airports and highways; and
- represents a noise exposure level which is normally dominated by aircraft noise and not other community or nearby highway noise sources.

Noise Effects on Domestic Animals and Wildlife

Animal species differ greatly in their responses to noise. Each species has adapted, physically and behaviorally, to fill its ecological role in nature, and its hearing ability usually reflects that role. Animals rely on their hearing to avoid predators, obtain food, and communicate with and attract other members of their species. Aircraft noise may mask or interfere with these functions. Secondary effects may include nonauditory effects similar to those exhibited by humans - stress, hypertension, and other nervous disorders. Tertiary effects may include interference with mating and resultant population declines.

Many scientific studies are available regarding the effects of noise on wildlife and some anecdotal reports of wildlife "flight due to noise." Few of these studies or reports include any reliable measures of the actual noise levels involved.

In the absence of definitive data on the effect of noise on animals, the Committee on Hearing, Bioacoustics, and Biomechanics proposed that protective noise criteria for animals be taken to be the same as for humans (NAS 1977).

References

- NAS 1977. Guidelines for Preparing Environmental Impact Statements on Noise,” Committee on Hearing, Bioacoustics and Biomechanics, The National Research Council, National Academy of Sciences, 1977.
- USAF 2002. Flyover Noise Calculator, Version 1.0.2, beta, USAF/AFRL/HECB, Wright-Patterson AFB, OH, May 2002.

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**SUPPLEMENT TO
BIOLOGICAL ASSESSMENT
ESTABLISHMENT AND OPERATION OF AN INTELLIGENCE,
SURVEILLANCE, RECONNAISSANCE, AND STRIKE
CAPABILITY,
ANDERSEN AIR FORCE BASE, GUAM**

This document contains supplemental noise level information and analysis requested by USFWS (Pacific Islands Office, Honolulu, Hawaii). This document has been subject to multiple revisions, and is in response to comments received by PACAF from USFWS on June 2, 2006.

AIRCRAFT OPERATIONS

Refer to Subchapter 2.1.3 of the March 2006 Biological Assessment for additional information related to the aircraft operations.

Analysis points were established near MSA 1 and Northwest Field for noise analysis. The points were selected based on: (1) the location of Mariana fruit bat observations; (2) known bat foraging sites identified by radio tracks of individual bats marked in a previous study; (3) the location of Mariana crow observations, and (4) the enclosure area proposed as a conservation measure as part of establishing the ISR/Strike capability. Table 1 lists the combined airfield operation events for all aircraft operating on the aircraft flight tracks within an approximate 2,000-2,500 foot radius of the analysis points near MSA 1 and Northwest Field. The analysis points are depicted on Figure 1 (S) at the end of this supplement.

Table 1 Airfield Operation Events at Points Near MSA 1 and Northwest Field

Operations Condition	Point G			Point H		
	day	dark	total	day	dark	total
Current Condition	0.0976	0.0156	0.1132	0.1322	0.0331	0.1653
Alternative A	0.2916	0.0374	0.3289	0.1561	0.0391	0.1952
Net Change due to Alternative	+0.1940	+0.0218	+0.2157	+0.0239	+0.0060	+0.0299
Operations Condition	Point I			Point J		
	day	dark	total	day	dark	total
Current Condition	0.0000	0.0000	0.0000	1.5632	0.3900	1.9532
Alternative A	0.3170	0.0793	0.3963	1.8838	0.4100	2.2938
Net Change due to Alternative	+0.3170	+0.0793	+0.3963	+0.3206	+0.0200	+0.3406

AIRCRAFT ACCIDENT POTENTIAL

Areas around airports are exposed to the possibility of aircraft accidents even with well-maintained aircraft and highly trained aircrews. Despite stringent maintenance

requirements and countless hours of training, past history makes it clear that accidents are going to occur.

The risk of people on the ground being killed or injured by aircraft accidents is miniscule. However, an aircraft accident is a high-consequence event and, when a crash does occur, the result is often catastrophic. Because of this, the Air Force does not attempt to base its safety standards on accident probabilities. Instead, the Air Force approaches safety from a land-use-planning perspective through its Air Installation Compatible Use Zone (AICUZ) program. Designation of safety zones around the airfield and restriction of incompatible land use reduces the public's exposure to safety hazards.

Clear zones (CZ) and accident potential zones (APZs) were developed from analysis of over 800 major Air Force accidents that occurred within 10 miles of an Air Force installation between 1968 and 1995. The study found that 61 percent of the accidents were related to landing operations and 39 percent occurred during takeoff. Fighter and trainer aircraft accounted for 80 percent of the accidents, with large aircraft and helicopters accounting for the remaining 20 percent. Figure A depicts the three safety zones and summarizes the location of the accidents within a 10 nautical mile (NM) radius of the airfield.

Figure A Air Force Aircraft Accident Data (838 Accidents - 1968-1995)

		← 3,000' →		← 5,000' →		← 7,000' →		
↑ 3,000' ↓		CLEAR ZONE	230 Accidents (27.4%)	ACCIDENT POTENTIAL ZONE I	85 Accidents (10.1%)	ACCIDENT POTENTIAL ZONE II	47 Accidents 5.6%)	↑ 3,000' ↓
	<u>RUNWAY</u>							
	209 Accidents (24.9%)							

Table 2 10-Year Fighter, Tanker, and Bomber Class A Aircraft Mishap Information

Aircraft	10-Year Average Class A Mishap Rate
F-15	2.04
KC-135	0.09
B-1	2.40
B-2	0.00
B-52	0.41

Note: The mishap rate is a 10-year (FY93-FY02) average based on the total mishaps and 100,000 flying hours. Data for the F-15 are used for the fighter aircraft because the Air Force Class A Mishap data do not include the F-22. No data are available for the UAVs.

It is impossible to predict the precise location of an aircraft accident. The types of landing and takeoff operations the ISR/Strike F-22, F-15E, B-1, B-2, B-52, KC-135, and UAVs would be accomplished at Andersen AFB would be consistent with those currently flown at the Base and those associated with the operations on which the 10-year averages listed in Table 1 are based.

There are 344 acres of surface area in APZ I. Air Force aircraft accident statistics found 75 percent of aircraft accidents resulted in definable impact areas. The size of the impact areas were:

- 5.06 acres overall average.
- 2.73 acres for fighters and trainers.
- 8.73 acres for heavy bombers and tankers.

The size of the definable impact area for a fighter was used for the analysis because nearly all the operations on Runway 06 Left/24 Right would be accomplished by fighter aircraft. The Mariana fruit bat colony is located in the northwest corner of APZ I, about 300 feet east of the boundary between the CZ and APZ I at the northeast end of Runway 06 Left/24 Right at Andersen AFB. When applying the accident rate for a fighter from Table 2 to the projected annual hours for ISR/Strike fighter aircraft and the percent of accidents that occur in APZ I, it is estimated that 0.005 accidents would occur annually in APZ I at the northeast end Runway 06 Left/24 Right. Based on the size of the definable impact area for a fighter (2.73 acres) and the overall acres in APZ I (344 acres), the impact area would equate to 0.6 percent of the land area in APZ I. Based on the size of the Mariana fruit bat colony and the overall acres in APZ I, the colony occupies about 2.3 percent of the land area in APZ I. The size of the colony can vary (blow down of roosting trees from typhoons will expand the colony area), but Wheeler and Aguon (1978) mapped the colony covering approximately 8 acres, when 50 Mariana fruit bats were found on Guam (USFWS 1990). The USFWS Recovery Plan for the Mariana fruit

bat (USFWS 1990) states that a total number of 2,500 bats at 3 permanent colonies, with each colony numbering 400 bats, would be a threshold for delisting. Extrapolating 6.25 bats / acre (presumed density in 1978 at the Pati Point Colony) to 400 bats at the Pati Point Colony would suggest a colony size of 64 acres. This area represents approximately 18 percent of the APZ I. In summary, the probability is extremely low that an ISR/Strike aircraft involved in a Class A accident (the accident type most likely to result in a crash) would strike the current colony, and only slightly higher to strike a “recovered” colony size.

NOISE MODELING RESULTS

Four Analysis Points near MSA 1 and Northwest Field

Aircraft noise modeling was accomplished to establish the noise levels for use in the effects determination for the Mariana fruit bat and the Mariana crow. Subchapter 5.4 of the Biological Assessment contains the methodology used for the supplemental analysis. Table 3 lists the results of noise modeling for a single aircraft overflight at the previously described four analysis points for the current condition airfield operation events and the Alternative A events. Figure 1 (S) depicts the locations of the four analysis points. The noise levels are indicated in terms of maximum A-weighted sound level (L_{max}) and sound exposure level (SEL). Appendix D of the Biological Assessment contains a description of each noise metric. The noise values reflect the L_{max} and SEL from a single aircraft overflight on the track nearest the analysis point and are based on the noisiest aircraft operating on the track.

Table 3 **Single Event Aircraft Noise Levels at Points near MSA 1 and Northwest Field**

	Point G	Point H	Point I	Point J
Current Condition Aircraft				
Aircraft Altitude	1,524	366	NA	457
L_{max}	95	83	0	72
SEL	101	90	0	81
Alternative A Aircraft				
Aircraft Altitude	1,524	823	305	457
L_{max}	94	86	97	96
SEL	105	95	103	104

Note: NA=nearest track is not used under the condition. Aircraft altitude indicated in feet AGL. Noise values are indicated in dBA. SEL noise values are based on noise from the noisiest aircraft operating on the track nearest the point for the condition. L_{max} noise values are based on noise from the noisiest aircraft operating on the track nearest the analysis point. A temperature of 80 degrees Fahrenheit and a relative humidity of 82 percent were used for the noise modeling climatological conditions.

Aircraft Altitude and Noise below the Aircraft Ground Tracks

Figure 1 (S) at the end of this supplement is an overview map showing northern Guam, flight tracks, and view extents of Figure 2 (S) and Figure 3 (S). Figure 2 (S) at the end of this supplement depicts the type of aircraft that produces the L_{max} , the L_{max} , aircraft altitude, and type of flight track (arrival, departure, or closed pattern) at various points along the aircraft ground tracks that occur in the MSA and Northwest Field.

Table 4 presents the type of aircraft that produces the L_{max} , the L_{max} , aircraft altitude, and type of flight track at points in the areas to the immediate north of the runways at the main base. Figure 3 (S) at the end of this supplement shows the locations of the points listed in Table 4. Multiple aircraft types may operate on the same track and the values presented on Figure 3 (S) and Table 4 depict the noise from the loudest aircraft type that operates on the specific track.

Table 4 Aircraft and Noise Information at Points along the Aircraft Ground Tracks to the Immediate North of the Main Base Airfield

Point 1	Point 2	Point 3
F-22 98 dBA 3,000 feet AGL departure	B-1 92 dBA 3,000 feet AGL departure	B-1 92 dBA 3,000 feet AGL departure
Point 4	Point 5	Point 6
F-22 92 dBA 1,500 feet AGL arrival	UH-60 98 dBA 500 feet AGL departure	F-18 96 dBA 3,500 feet AGL departure
Point 7	Point 8	Point 9
F-22 96 dBA 3,000 feet AGL departure	F-22 100 dBA 2,500 feet AGL departure	F-18 98 dBA 2,800 feet AGL departure
Point 10	Point 11	Point 12
B-1 96 dBA 2,200 feet AGL departure	F-18 110 dBA 1,000 feet AGL departure	F-22 110 dBA 1,000 feet AGL departure
Point 13	Point 14	Point 15
F-22 91 dBA 900 feet AGL closed pattern	F-22 92 dBA 1,000 feet AGL closed pattern	F-22 103 dBA 1,500 feet AGL closed pattern
Point 16	Point 17	Point 18
UH-60 94 dBA 500 feet AGL closed pattern	UH-60 94 dBA 50 feet AGL departure	F-22 88 dBA 1,500 feet AGL arrival
Point 19	Point 20	Point 21
F-22 108 dBA 1,300 feet AGL closed pattern	F-22 110 dBA 1,000 feet AGL departure	F-22 112 dBA 900 feet AGL departure

Multiple Aircraft Formation

Fighter aircraft often depart and arrive in formations of four or two aircraft, which are typically referred to as a 4-ship or a 2-ship formation. Two conditions for timing between aircraft in formation could occur: 10 seconds for takeoff; and 4 seconds for arrivals. The noise discussion in this section and depicted in Figures 4 (S) and 5 (S) at

the end of this supplement are based on the 4-second interval because this interval would cause the noise to occur over a shorter time period. The noise from 2- and 4-ship formations is not cumulative and reflects the L_{\max} for each aircraft.

A 4-ship departure can be accomplished under two separate conditions. The first condition would consist of two elements of two aircraft in each element in which both aircraft in the element takeoff simultaneously. Spacing between the two elements would be about 10 seconds. In the second condition, each aircraft would take off as a single aircraft with about 10 seconds spacing between aircraft. The aircraft would rejoin as a 4-ship formation on departure. Likewise, a 2-ship formation departure can consist of both aircraft taking off simultaneously or as single aircraft with about 10 seconds of spacing between aircraft.

On arrival, the formation aligns on an extended runway centerline at approximately 3 miles from the runway and tracks inbound on the centerline to the runway end, maintaining about 1,500 feet above ground level (AGL). The lead aircraft usually turns to downwind when overhead the approach end of the runway at 1,500 feet AGL and following aircraft typically turn 4 seconds after the preceding aircraft. Thus, following aircraft don't start the turn until farther down the runway (about 2,300 feet between the points at which aircraft turn), maintaining 1,500 feet AGL. From over the runway, each aircraft:

- Turns right or left (depending on the runway being used);
- Rolls out on a track heading 180 degrees opposite to the inbound direction of travel (this opposite direction track is called "downwind");
- Tracks on downwind to a point at which the aircraft initiates a turn back toward the runway and descends from 1,500 feet AGL;
- Intercepts the extended runway centerline about a mile from the runway end and at approximately 300 feet AGL; and, from that point,
- Continues to landing.

There would be no time in formation departures and arrivals in which four aircraft could be in the same place at the same time. Thus, there would be no condition where the noise from all four aircraft should be added together. The most extreme noise condition from operations would occur when a 4-ship formation overflies a location in two elements of two aircraft each, with approximately 4 seconds of spacing between the elements (see Figure 4 (S) at the end of this supplement). Another condition in which the noise would exceed that of a single aircraft flyover with extended time between overflights would occur when each aircraft in a 4-ship formation overflies a point with this 4-second spacing between aircraft (see Figure 5 (S) at the end of this supplement).

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly. The shortcut method in Table 5 can be used to combine sound levels.

Table 5 Shortcut for Combining Sound Levels

Difference between Two dB Values	Add the Following to the Higher of the Two dB Values
0 to 1	3
2 to 3	2
4 to 9	1
10 or more	0

Based on the above information, Figures 4 (S) and 5 (S) at the end of this supplement, respectively, show the noise for two operating conditions: an element consisting of two aircraft; and 4 aircraft with 4 seconds of spacing between aircraft and theoretically overflying the same point. The L_{\max} values presented in the figures are for an F-22 aircraft during takeoff (92 percent military power and 300 knots indicated airspeed) and at a distance of 1,000 feet from the receptor (directly overhead or slant range).

Mariana Fruit Bat Colony Movements

Mariana fruit bats have chosen colony sites at a variety of locations in northern Guam, including Orote Point (Perez 1972), Jinapsin Point (Wiles 1985), and the current colony location at Pati Point. Colony size movements between islands have been observed, although exact causes of a colony size movement are unknown. Noise studies included as conservation measures will consider colony movements. Writing the study design will be a cooperative effort between Andersen AFB, USFWS, and DAWR. Further, appropriate management actions will be taken in concert with USFWS and DAWR for the protection of the new colony, should a colony movement occur. These actions will be outlined in the expected revision of the Andersen AFB INRMP.

SUMMARY OF EFFECTS DETERMINATION

The introduction to Chapter 6 of the Biological Assessment contains the definitions used for the effects determination. No ISR/Strike construction activities would occur within MSA 1, at Northwest Field, or at or near any of the analysis points selected for analysis. Therefore, any effects on federally listed species that might occur would be from aircraft operations. The following paragraphs contain the effects determination from aircraft noise within the MSA 1 and Northwest Field areas.

Mariana fruit bat

Aircraft overflight would occur over areas that contain suitable habitat for roosting and foraging. Bats appear to prefer foraging habitat where there are more large fruit trees available, such as the *Neisosperma* – *Macaranga* (ASA project area) or *Neisosperma* – *Premna* (Northwest Field) forest types and other intact secondary forest areas, which contain suitable canopy structure and composition. Figures 2 (S) and 3 (S), respectively, show the aircraft flight track locations in the areas around the MSA and Northwest Field and near the main base. Figure 6 (S) at the end of this supplement shows locations of recent observations of Mariana fruit bats. As indicated in Table 1, there would be minor increases in daily aircraft overflight at each of the four analysis points, with the greatest increase being about 0.40 additional overflights. Point J would experience the greatest number of nearby overflights of any of the four points at an approximate 2.3 daily

overflights, of which 0.4 are flights during time of darkness. Mariana fruit bats are known to leave roosting areas and forage after sunset for several hours. The MSA 1 area and the Northwest Field points were selected because they are known foraging areas; the additional overflight exposures would be less than once every two-three days. It is unlikely that this additional exposure would affect the bats. It is unknown if bats would become habituated to more frequent noise, but recent observations indicate they have become habituated to aircraft noise (Janeke 2005). Studies of habituation in other animal species have not observed any level of tolerance that has eventually become unacceptable to the animals when the type of disturbance has remained constant. It is known that bats have very sensitive hearing, but the frequency spectrum is much higher than sounds being produced from training activities under this proposal (Dallard 1965).

Hearing sensitivity in a related megachiropteran fruit bat, *Rousettus aegyptiacus*, spans from about 2.25 kHz to 64 kHz at a 60 dB sound pressure intensity (Koay, *et al.* 1998). From a behavioral auditory threshold study of *Rousettus aegyptiacus*, their greatest sensitivity is in the range of 8-10 kHz (Suthers and Summers 1980), much higher than the frequency spectrum of aircraft. Interestingly, the study found no behavioral response to sounds below 1 kHz, which indicates that their sensitivity or even ability to hear below that level is low to nonexistent. Much of the acoustic energy of aircraft noise is below 2 kHz.

Habituation of bats to increased overflight noise is expected (Janeke 2005), especially since aircraft overflights will be incrementally increased over a multi-year period. The degree of habituation, however, is not represented in the current literature. Conservation measures involve an Adaptive Management strategy, which is commonly used when data gaps exist, to continually address noise effects as overflights increase. Conservation measures also allow for modification of overflight patterns to reduce effects of increased aircraft. Modifications will be based on proposed bat studies, as described in Subchapter 2.3 of the Biological Assessment.

Noise events associated with aircraft overflight may affect the Mariana fruit bat; however, adverse effects are offset by the adaptive management conservation measure. This conservation measure includes a strategy that uses scientific research to affect operational changes to overflight tracks.

Mariana crow

Crows are sensitive to human disturbances, and may be particularly sensitive to noise generated from aircraft (Morton 1996). Aircraft overflights would occur over areas that contain suitable habitat for nesting and foraging. Figures 2 (S) and 3 (S), respectively, show the aircraft flight track locations in the areas around the MSA and Northwest Field and near the main base. Figure 6 (S) shows recent Mariana crow observations, as provided by DAWR (Dicke 2006). As indicated in Table 1, there would be minor increases in daily aircraft overflight at each of the four analysis points, with the greatest increase being about 0.40 additional overflights. Point J would experience the greatest number of nearby overflights of any of the four points at an approximate 2.3 daily overflights. These few additional aircraft overflights are not likely to make any behavioral changes in Mariana crow behavioral responses. Morton (1996) demonstrated that Mariana crows will react negatively to aircraft overflight noise and other human

disturbances in some cases, but not always. Noise disturbance of the Mariana crow can cause distress in the birds, cause them to flush from the nest and disrupt nest building, incubation, and nest attendance at least temporarily. However, if the Mariana crow nests are abandoned due to disturbance or predation, the pairs will generally attempt to re-nest (Morton 1996). In addition, crows may respond to visual stimuli as well as noise stimuli (e.g., aircraft outlines, pedestrians). Other studies demonstrate that birds are likely to hear loud noises (e.g., sonic booms), and stop the activity in which they are engaged (Higgins 1974), but a *Corvus* species study showed the birds rapidly returned to normal activities after the noise event (Davis 1967).

There is some indication that Mariana crows can be tolerant of disturbances, much like related species of crows throughout the world. The fact that Morton (1996) observed some pairs renesting after nest disturbances may indicate their tenacity. This tolerance can lead to habituation of disturbances that are not threatening to the individuals. Habituation is a process many species of animals undergo to cope or tolerate environmental stimuli inconsequential to their livelihood or well-being. Animals like those discussed in this study respond to visual and acoustic stimuli potentially harmful to them. Typically this is due to their innate predator-prey response mechanism, which causes an increase in alertness or flushing or fleeing from the impending threat. There are many studies showing that reoccurring events without consequence cause animals to eventually ignore those stimuli (The Wildlife Society 2005). Busnel (1978) observed that many bird species are able to habituate to noise disturbance. Andersen, *et al.* (1989) concluded that Red-tailed hawks could have habituated to aircraft. Becker (2002) suspected roosting Bald eagles were habituated to disturbance when exposed to a large industrial construction project. Delaney, *et al.* (1999) found that endangered Mexican spotted owls become habituated to disturbances like chainsaw noise and helicopter noise. Observations of Mariana crows and Mariana fruit bats by Morton (1996) during aircraft flyover events demonstrated that there were reactions in some cases where some observed individuals responded to the noise or visual stimuli and others did not. This could be due to the experience level of the animals, where resident crows or bats were habituated to the aircraft events, and introduced crows (originating from Rota) or young were not accustomed to the intrusions.

Aircraft altitudes in areas where the Mariana crows have established nests in the past (Morton 1996) would be 300 meters AGL and greater. Noise modeling was accomplished to determine the maximum sound level at four analysis points. Sound levels from noise modeling were compared to information from the Morton (1996) study to determine the potential for effect.

Noise modeling indicated that the maximum sound levels (L_{max}) produced under the proposed action (*i.e.*, 97 dBA at Point I) would be 13 dBA less than the maximum noise from the Morton (1996) study (*i.e.*, 110 dBA). Noise from aircraft overflights did not cause nest abandonment for at least one pair of Mariana crows when aircraft were restricted to altitudes greater than 300 meters AGL (Morton 1996). Based on the similarities of the maximum noise levels and AGL when comparing the Morton (1996) study and the proposed action, Mariana crow reaction to noise would be expected to be similar or less than that found in the Morton study; that is, some crows might be flushed from the nest, while others show no negative effects. Additionally, there is a possibility

that Mariana crows will habituate to the aircraft noise since there is no negative reinforcement to cause nest abandonment.

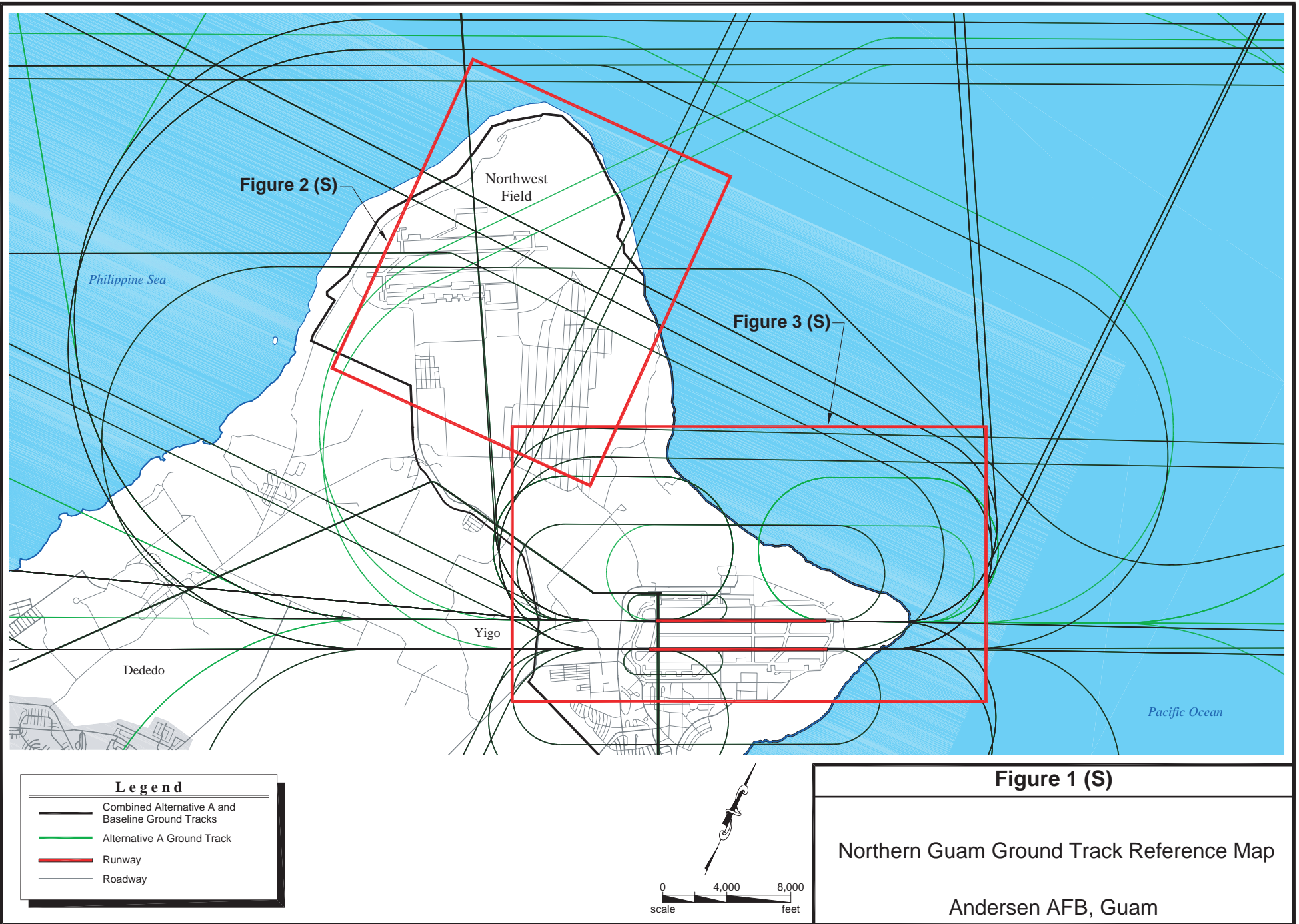
Noise from aircraft overflights are expected to affect Mariana crow behavior. However, the adaptive management conservation measure will reduce these effects by applying strategy to modify ground tracks based on monitoring studies.

Summary of Effects Determination

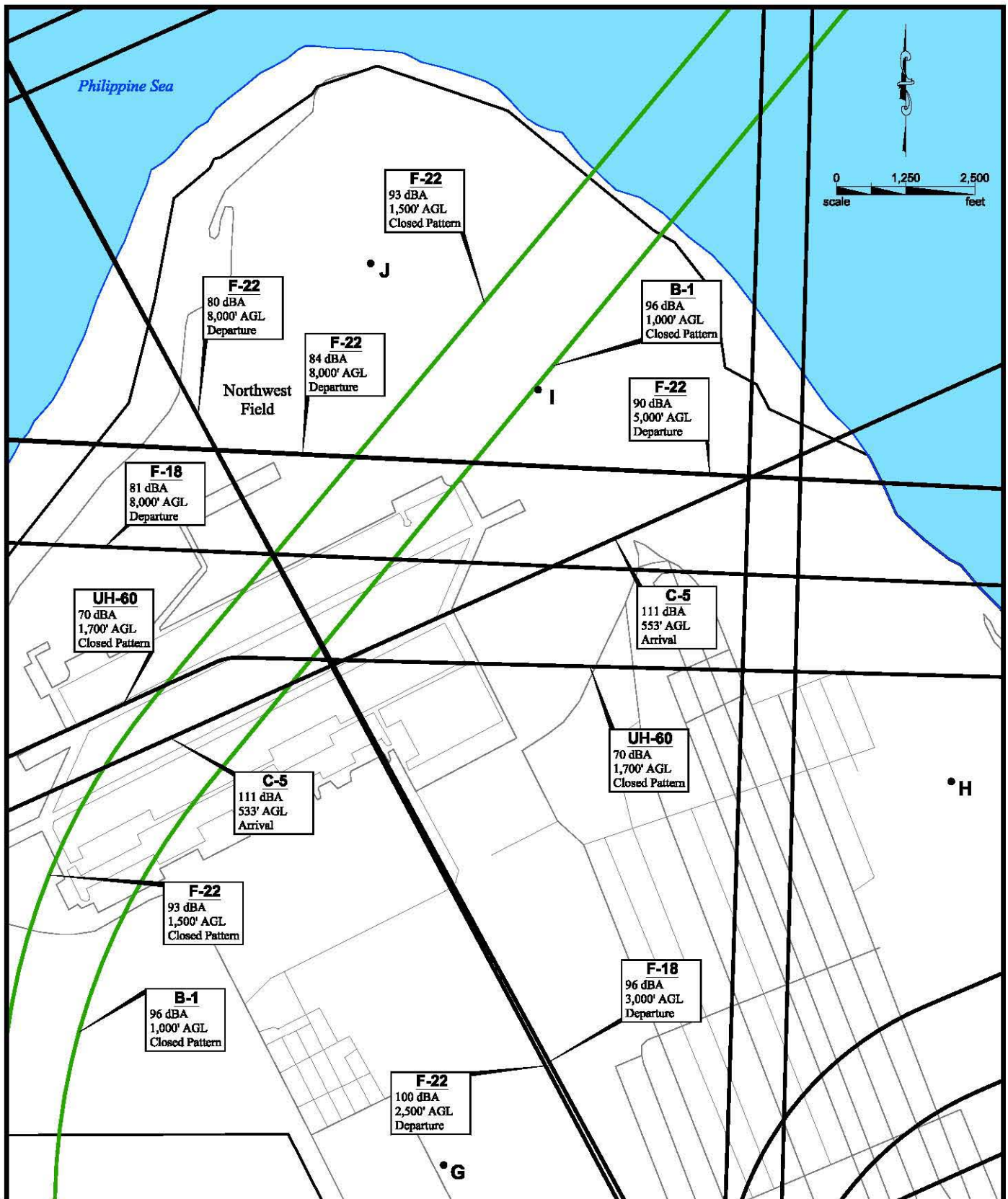
The summary in Subchapter 6.4 of the Biological Assessment applies to the four analysis points identified for supplemental analysis and the areas surrounding the points.

REFERENCES

The Reference section of the Biological Assessment contains the references used in this supplemental analysis.



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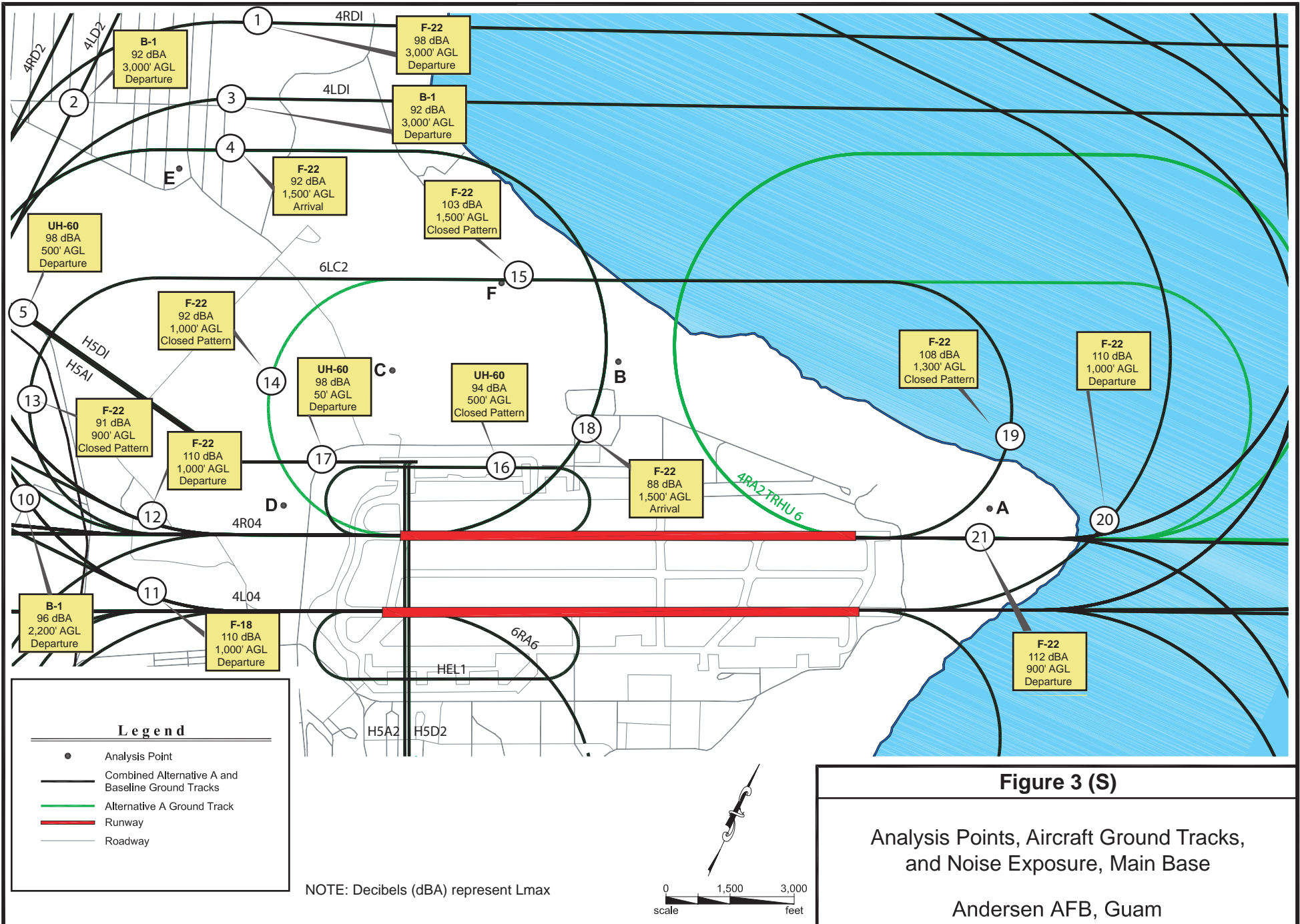
Note: Decibels (dBA) represent Lmax.

Figure 2 (S)

Supplemental Analysis Points and Aircraft Ground Tracks

Andersen AFB, Guam

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Figure 4 (S) 2-Aircraft Element with 4 Second Spacing (F-22)

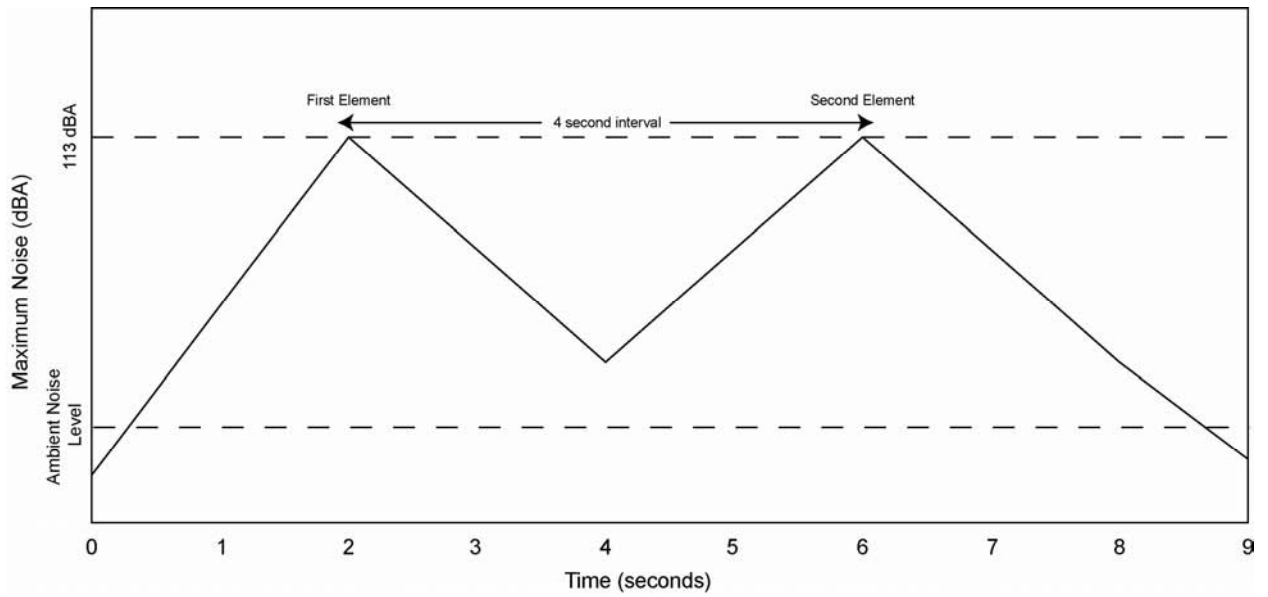
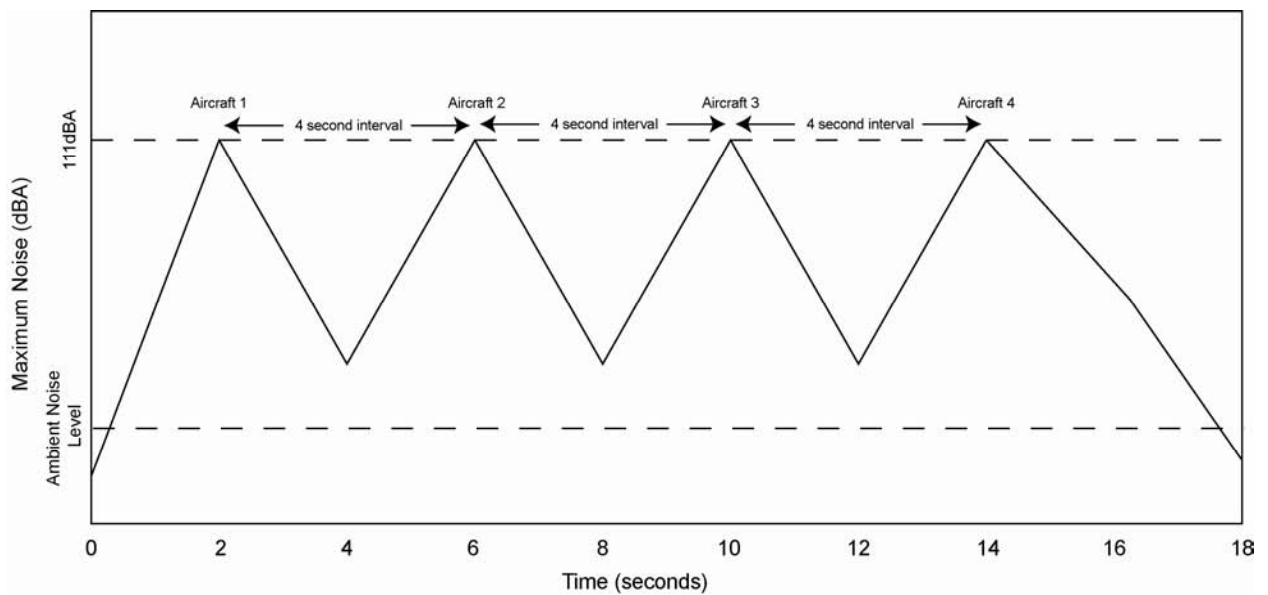


Figure 5 (S) 4 Aircraft with 4 Second Spacing (F-22)



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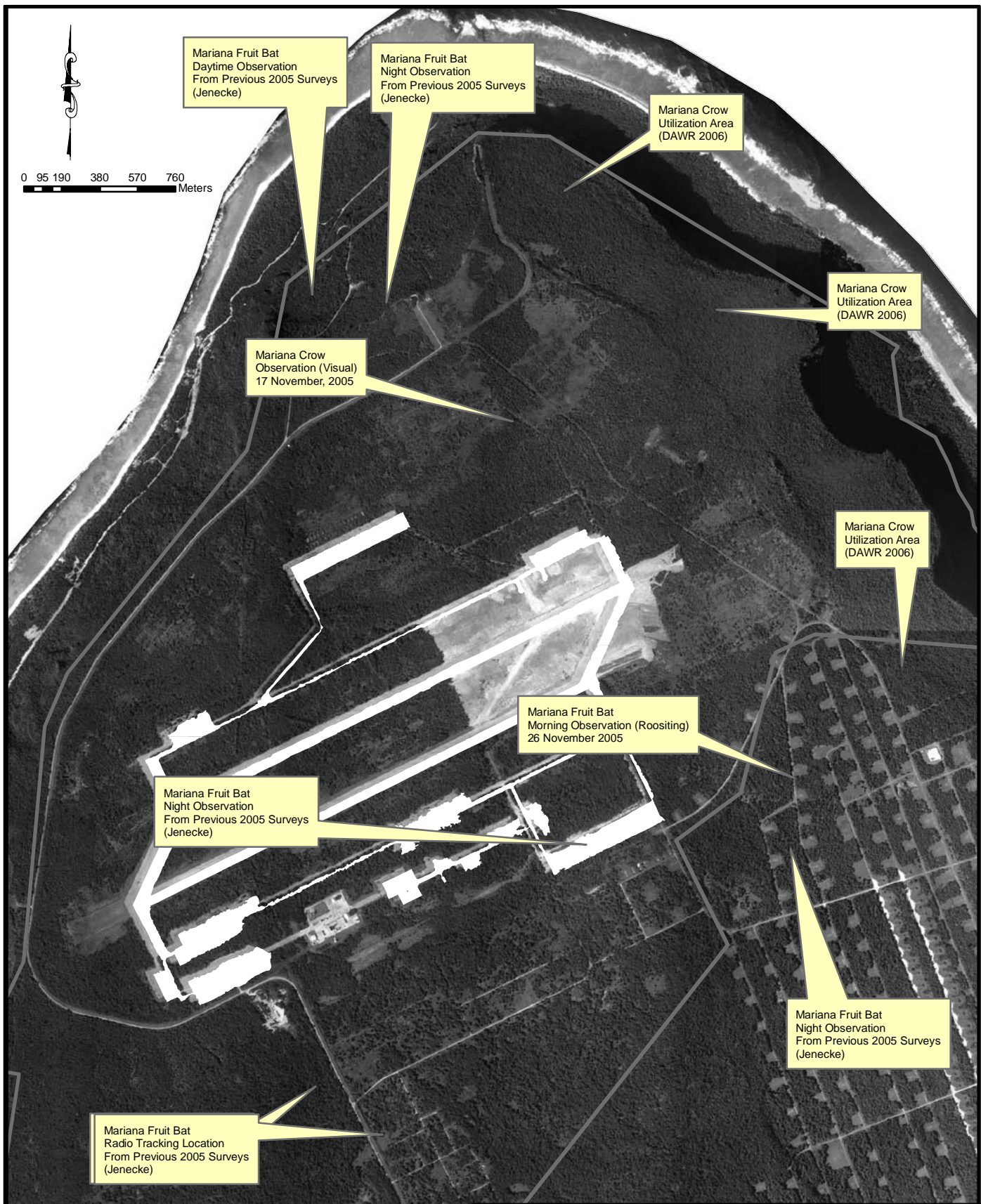


Figure 6 (S)

Mariana Crow and Mariana Fruit Bat Observations

Andersen AFB, Guam

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United States Department of the Interior



FISH AND WILDLIFE SERVICE

Pacific Islands Fish and Wildlife Office
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In Reply Refer To:
1-2-2006-F-266

OCT 03 2006

Lieutenant Colonel Peter A. Ridilla
Department of the Air Force
36th Civil Engineer Squadron (PACAF)
Unit 14007
APO AP 96543-4007

Subject: Biological Opinion on the Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability Project on Andersen Air Force Base, Guam

Dear Lieutenant Colonel Ridilla:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the U.S. Air Force's (Air Force) proposed Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, and Strike Capability (ISR/Strike) project on Andersen Air Force Base (AFB), Guam. This opinion addresses the effects of the proposed action on the endangered Mariana crow (*Corvus kubaryi*) and the threatened Mariana fruit bat (*Pteropus mariannus mariannus*) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 USC 1531, et seq.). Although the endangered Guam Micronesian kingfisher (*Halcyon cinnamomina cinnamomina*), and Guam rail (*Gallirallus owstoni*) are extirpated from Guam, they are addressed in this opinion based on the requirements identified in the Cooperative Agreement between the Air Force and Service for the establishment and management of the Guam National Wildlife Refuge (Air Force and Service 1994). As stated in our June 21, 2006, letter, this formal consultation was initiated on May 22, 2006.

This biological opinion is based on the following information: 1) the Air Force's March 2006 Biological Assessment (BA) (Air Force 2006a) and April, May, and June supplements; 2) the Air Force's April 2006 Draft Environmental Impact Statement (EIS) (Air Force 2006b); 3) peer-reviewed articles and gray literature; 4) information in our files; and 5) meeting notes and correspondence associated with this consultation. A complete administrative record of this consultation is on file in the Service's Pacific Islands Fish and Wildlife Office in Honolulu, Hawaii.

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Consultation History

December 13, 2004: The Air Force briefed the Service on the proposed ISR/Strike project and other Air Force projects on Andersen AFB at the Service's Pacific Islands Fish and Wildlife Office.

March 22, 2005: The Air Force sent the Service a letter requesting technical assistance on the proposed ISR/Strike and Northwest Field Beddown projects. This letter was not received by the Service until August 30, 2005 (see below).

May 18, 2005: The Air Force published a Notice of Intent to prepare a draft EIS for the proposed ISR/Strike project in the *Federal Register*.

June 24, 2005: The Service sent the Air Force a letter with comments on the May 18, 2005, Notice of Intent.

August 30, 2005: The Service received an August 25, 2005, letter from the Air Force requesting guidance on whether to proceed with formal or informal consultation on the proposed ISR/Strike project. This letter also included a copy of the Air Force's March 22, 2005, letter and a copy of the *Field Studies Survey Report, Vegetation Community Mapping, AAFB, Guam* which contained information on the vegetation in the proposed project area (Air Force 2005).

September 28, 2005: The Service met with the Air Force at the Service's Pacific Islands Fish and Wildlife Office to discuss the status of the proposed ISR/Strike project and whether formal or informal consultation was appropriate.

September 30, 2005: The Service sent the Air Force a letter requesting additional information regarding the status of listed species and vegetation community composition and structure within the project areas.

October 30, 2005: The Air Force's natural resource personnel at Andersen AFB sent an electronic mail message to the Service requesting our review of the proposed vegetation survey methodology. On November 4, 2005, we replied to the Air Force's electronic mail message with suggestions for survey methods within the project area for listed species.

February 13, 2006: The Service received an electronic mail message from the Air Force requesting informal comments on the February 2006 Draft BA for the ISR/Strike project. On February 28, 2006, we sent an electronic mail message to the Air Force containing informal comments on the February 2006 Draft BA for the ISR/Strike project.

March 23, 2006: The Service received a March 22, 2006, letter from the Air Force requesting formal consultation on the proposed ISR/Strike project. This letter included the March 2006 BA of the proposed project.

April 21, 2006: The Service sent a letter to the Air Force confirming receipt of its March 22, 2006, request for formal consultation, and requested additional information on potential project impacts to listed species in order to initiate the consultation.

May 2, 2006: The Service met with the Air Force at the Service's Pacific Islands Fish and Wildlife Office to discuss project impacts and avoidance and minimization measures to reduced impacts to listed species.

May 10, 2006: The Service participated in a conference call with the Air Force and its contractors to discuss potential noise impacts to listed species from increased aviation operations at Andersen AFB.

May 12, 2006: The Air Force published a Notice of Availability in the *Federal Register* for the April 2006 Draft EIS for the proposed ISR/Strike project.

May 22, 2006: The Service received the Air Force's May 19, 2006, letter providing the additional information on noise analyses and potential aircraft accidents we requested in our April 21, 2006, letter.

June 2, 2006: The Service sent the Air Force an electronic mail message requesting additional information and clarification regarding aviation noise and flight tracks in the vicinity of listed species territories.

June 12, 2006: The Air Force sent us an electronic mail message containing supplementary information on aviation noise and flight tracks requested on June 2, 2006.

June 22, 2006: The Service sent the Air Force a letter indicating that the information required for the consultation was complete and that formal consultation had been initiated on May 22, 2006. The letter also stated that consultation would be completed on October 4, 2006.

July 19, 2006: The Air Force sent an electronic mail message to the Service requesting that the biological opinion be completed within 90 days of initiation due to conflicts with the project schedule.

August 1, 2006: The Service met with the Air Force and its contractors at the Service's Pacific Islands Fish and Wildlife Office to discuss the timeline for the formal consultation, impacts to listed species, and conservation measures. The Service agreed to expedite the completion of the biological opinion.

August 4, 2006: The Service sent the Air Force an electronic mail message requesting inclusion of additional avoidance and minimization measures associated with construction activities for the ISR/Strike project.

August 10, 2006: The Service sent the Air Force an electronic mail message inquiring whether the proposed brown treesnake (*Boiga irregularis*) control conservation measure could be

modified to include research and development of appropriate snake control measure for the Mariana fruit bat colony.

August 14, 2006: The Air Force sent the Service electronic mail messages agreeing to consider the proposed modification of the brown treesnake control conservation measure and avoidance and minimization measures for project construction activities discussed in our August 4 and 10 electronic mail messages.

August 17, 2006: The Service and the Air Force exchanged electronic mail messages regarding proposed measures to minimize and avoid potential impacts associated with the Mariana fruit bat colony abandoning Pati Point due to the proposed project.

August 31, 2006: The Service solicited comments from the Air Force via electronic mail on the "Description of the Proposed Action" for this Biological Opinion. The Air Force and Service exchanged electronic mail messages to finalize this project description on September 7, 12 to 15, and 19, 2006.

BIOLOGICAL OPINION

Description of Proposed Action

The Air Force is proposing to establish an Intelligence, Surveillance, Reconnaissance, and Strike Operational Capability at Andersen AFB, Guam (Figure 1). The objective of the ISR/Strike project is to achieve pre-engagement battle space awareness, locate and identify critical adversary movement, achieve assured success through air dominance, and deliver decisive effects via persistent and precise application of air and space power over the next decade (Table 1). The following project description is a summary of construction activities, aircraft operations, anticipated personnel increases, and conservation measures as presented in the BA (Air Force 2006a), Draft EIS (Air Force 2006b), and correspondence and meetings with Air Force personnel.

Facilities and Construction

Facility construction will begin in fiscal year (FY) 2007. Sixty-seven construction projects are included in the proposed action. Most of these projects will occur on previously developed land on the main portion of Andersen AFB and are not expected to impact listed species on Guam. However, the increase in personnel, goods, and cargo associated with these projects may impact listed species outside of Guam (see "Personnel Increases" below). Of the proposed construction projects, only the Aircraft Staging Area, Commercial Entry Gate, and Truck Inspection Facility are expected to impact listed species on Guam (Figure 2). These three projects are described in detail below. For additional information on the other construction projects associated with this proposed action, see the associated Draft EIS (Air Force 2006b).

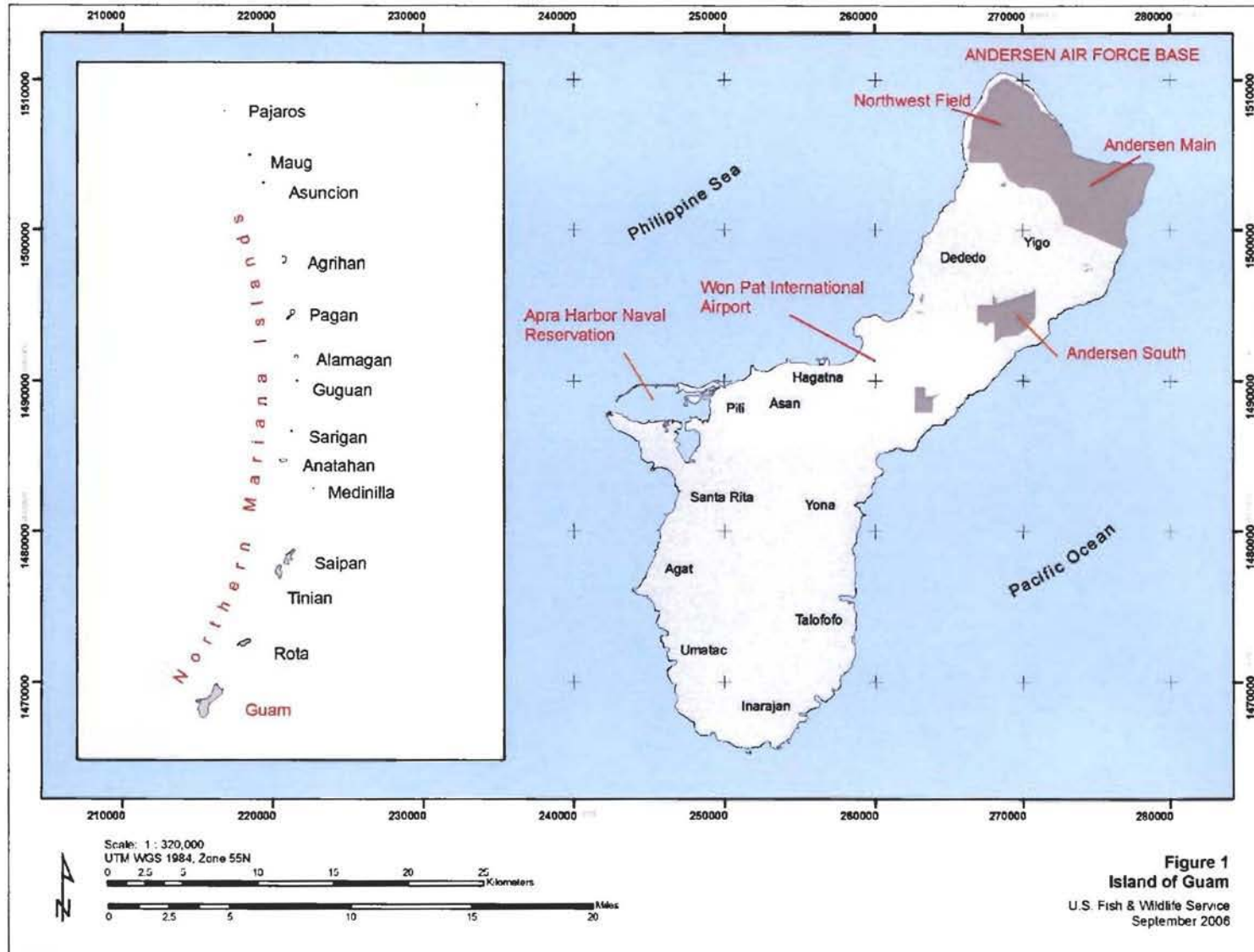


Table 1. Draft Timeline for the Proposed ISR/Strike Project

	Construction Phases		Operational Phases		
	FY07 ^a	FY08	Phase 1 FY09 – FY13	Phase 2 FY14 – FY16	Phase 3 FY17+
Construction Activities					
Commercial Entry Gate	-	-	Construction FY09-FY10	-	-
Truck Inspection Facility	-	-	Construction FY09-FY10	-	-
Global Hawk Hangar (for UAVs ^b)	Construction Begins FY07	-	Construction Ends FY09	-	-
Aircraft Staging Area	-	-	Construction Begins FY10	-	Construction Ends FY17+
Aircraft Operations					
Based on Andersen AFB	-	-	4 UAV 12 Tankers	4 UAV 12 Tankers	4 UAV 12 Tankers
Rotating to Andersen AFB	-	-	6 Bombers 24 F-22A	6 Bombers 24 F-22A	6 Bombers 48 F-22A
Total Number of Aircraft	-	-	46	46	70
Number of Personnel					
Permanent	-	-	650	650	650
Rotational	-	-	850	850	1,250
Dependents	-	-	1,100	1,100	1,100
Total	-	-	2,600	2,600	3,000
Conservation Measures					
Additional Staffing	-	Wildlife Management Specialist	-	-	-
Habitat Improvement	-	Ungulate Management Plan	(1) Ungulate Exclosure Fencing begins (2) Vegetation plot establishment	Ungulate Exclosure Fencing ends	-
Studies and Research	Base-wide vegetation surveys	-	-	-	-
Avoidance and Minimization Measures	Continuous and commensurate with specific construction projects and aircraft operations				
Snake Interdiction, Control and Research	Continuous				
Adaptive Management and Monitoring	As needed. Management decisions will be based on vegetation studies (FY07), multi-year noise studies, and other recommended actions.				

^a FY October 1 to September 30.^b Unmanned aerial vehicle (UAV).

The Aircraft Staging Area includes approximately 23 different facilities, taxiways, and aircraft parking aprons constructed to support F-22 or F-15E aircraft operations. Construction of the Aircraft Staging Area is expected to begin in FY10 and is expected to be completed after FY17 (see Table 1). Up to 48 fighter aircraft will be stored at the facility, and operational activity at the facility is expected to occur throughout the day and night. Approximately 74 hectares (ha) (184 acres [ac]) of vegetation will be cleared for the Aircraft Staging Area facilities and road construction (Table 2).

Table 2. Estimated Quantity of Vegetation to be Cleared as Part of the ISR/Strike Project

Vegetation Type	Cleared Area	
	Hectares	Acres
Aircraft Staging Area		
Neisosperma - Macaranga Forest	1.4	3.5
Guamia - Premna Forest	9.0	22.2
Guamia Forest	16.9	41.8
Aglaia - Guamia Forest	20.5	50.7
Hibiscus - Leucaena Shrub	6.0	14.8
Herbaceous Scrub	12.6	31.1
Aircraft Staging Area Subtotal	66.4	164.1
Commercial Entry Gate		
Guamia Forest	0.2	0.5
Vitex - Elaeocarpus Forest	1.8	4.4
Hibiscus - Leucaena Shrub	0.5	1.2
Herbaceous Scrub	1.0	2.5
Commercial Entry Gate Subtotal	3.5	8.6
Truck Inspection Facility		
Guamia Forest	0.5	1.2
Hibiscus - Leucaena Shrub	0.7	1.7
Herbaceous Scrub	2.8	6.9
Truck Inspection Facility Subtotal	4.0	9.9
Total All Facilities	73.9	182.6

The proposed Commercial Entry Gate and Truck Inspection Facility will be constructed in FY09 and FY10 (see Table 1). The Commercial Entry Gate will be constructed along Route 9 to allow for commercial and contractor vehicles to enter the base on the west side of Andersen main (see Figure 2). The Entry Gate will require a paved entry with gate, security fence, and small facility for security personnel. The amount of vegetation that will be cleared for the Entry Gate equates to 4 ha (9 ac). The Truck Inspection Facility will be constructed east of the Commercial Entry Gate for the purpose of inspecting vehicles and material delivered to the base (see Figure 2). The amount of vegetation that will be cleared for the Truck Inspection Facility is approximately to 4 ha (10 ac).

The existing road connecting the proposed Commercial Entry Gate and Truck Inspection Facility will be repaved to a width of 7 meters (m); 24 feet (ft) with 1-m (3-ft) shoulders on each side, for a total width of 9 m (31 ft). Because the existing road corridor can accommodate proposed road modifications, vegetation clearing within the existing road corridor will be minimal and limited

to removal of herbaceous or shrubby vegetation. Street lights will be installed along the road between the Commercial Entry Gate and the Truck Inspection Facility. The street lights will be hooded and illuminated only when the Commercial Entry Gate is in operation.

Aircraft Operations

At full implementation, the proposed ISR/Strike project will base 12 KC-135 tanker aircraft and four unmanned aerial vehicles (UAV) at Andersen AFB. As many as 48 fighter aircraft (F-22A and F-15E) and six bombers (comprising B-1, B-2, and B-52 bombers) will be rotated from other Air Force bases to Andersen AFB. The rotational period for aircraft (and personnel) will be 120 days. The 70 permanently based and rotational aircraft associated with the proposed ISR/Strike project will increase the amount of aircraft at Andersen AFB to 84. Currently, the number of aircraft rotating through Andersen AFB is between 12 and 24, depending on the rotation schedule.

Table 3 lists the projected annual and average daily airfield operations for ISR/Strike aircraft at Andersen AFB, as well as baseline current operations, and reflects the total recurring airfield operations condition after the proposed ISR/Strike project is fully established. Operations for the ISR/Strike aircraft include mission arrivals and departures as well as training sortie arrivals and departures, and closed pattern operations (closed pattern consists of two airfield operations [*i.e.*, one takeoff and one landing accomplished as a touch and go]).

Fighter aircraft flights will occur 240 days per year. Each of the 48 rotational fighter aircrews will fly 72 sorties per year, for a total of 3,456 annual sorties, or an average of 14.4 sorties per flying day. Eighty percent of the fighter operations will be accomplished by F-22 aircraft, and 20 percent will be accomplished by F-15Es. About 30 percent of the training sorties will be accomplished after dark (between 30 minutes after sunset and 30 minutes before sunrise). It is estimated that about 5 percent of the sorties and airfield operations flown during darkness (*i.e.*, 5 percent of 30 percent, or 1.5 percent) will occur between 2200 and 0700, the period known as “environmental nighttime.” Depending on the current rotation schedule, between zero and 12 fighter aircraft will rotate through Andersen AFB.

Based Tanker KC-135 aircrews will fly four sorties per day, 240 days per year from Andersen AFB. A typical sortie will include a departure from the base, aerial refueling of receiver aircraft, and an arrival at the base followed by an average of 60 to 90 minutes of instrument approach and closed pattern training before termination. It is estimated that about 13 percent of airfield operations for the tankers will occur during nighttime. Depending on the current rotation schedule, tanker aircraft rotating through Andersen AFB number between four and six. The UAVs will fly one sortie per day, 220 days per year from Andersen AFB. A typical sortie will include departing from the base, conducting its mission or training, and then returning to the base. A closed pattern will be flown on approximately half of the sorties. It is estimated that about 15 percent of airfield operations for the UAVs will occur during nighttime. Currently, no UAVs are based at Andersen AFB.

Table 3. Current and Proposed Action Annual and Average Daily Airfield Operations on Andersen AFB.

Aircraft	Arrival and Departure Operations		Closed Pattern Operations		Total Operations	
	Annual	Avg. Daily	Annual	Avg. Daily	Annual	Avg. Daily
CURRENT AIRCRAFT OPERATIONS						
Military AIRCRAFT						
EA-6	153	0.42	0	0.00	153	0.42
B-1	453	1.24	0	0.00	453	1.24
B-52	569	1.56	0	0.00	569	1.56
C-5	891	2.44	0	0.00	891	2.44
C-9	927	2.54	0	0.00	927	2.54
KC-10	204	0.56	0	0.00	204	0.56
C-12	88	0.24	0	0.00	88	0.24
C-17	314	0.86	0	0.00	314	0.86
C-20	285	0.78	0	0.00	285	0.78
C-21	606	1.66	0	0.00	606	1.66
C-130	1,956	5.36	0	0.00	1,956	5.36
KC-135	694	1.90	0	0.00	694	1.90
C-141	197	0.54	0	0.00	197	0.54
E-2	796	2.18	0	0.00	796	2.18
F-15	409	1.12	0	0.00	409	1.12
F-16	380	1.04	0	0.00	380	1.04
F-18	1,000	2.74	0	0.00	1,000	2.74
P-3	650	1.78	0	0.00	650	1.78
CH-46	88	0.24	0	0.00	88	0.24
Ch-53	95	0.26	0	0.00	95	0.26
SK-70	183	0.50	0	0.00	183	0.50
UH-60	14,206	38.92	59,648	163.42	73,854	202.34
Subtotal	25,144	68.88	59,648	163.42	84,792	232.30
Transient Civil Aircraft						
B-747	847	2.32	0	0.00	847	2.32
B-757	95	0.26	0	0.00	95	0.26
Subtotal	942	2.58	0	0.00	942	2.58
Total BASELINE	26,086	71.46	59,648	163.42	85,734	234.88
AIRCRAFT ADDED IN THE PROPOSED ACTION						
Fighter						
F-22	5,530	23.04	16,589	69.12	22,119	92.16
F-15 ^E	1,382	5.76	4,147	17.28	5,529	23.04
Fighter Subtotal	6,912	28.80	20,736	86.40	27,648	115.20
Tanker						
KC-135	1,920	8.00	5,760	24.00	7,680	32.00
UAV						
Global Hawk	440	2.00	220	1.00	660	3.00
Bomber						
B-1	432	1.80	864	3.60	1,296	5.40
B-2	96	0.40	192	0.80	288	1.20
B-52	432	1.80	864	3.60	1,296	5.40
Bomber Subtotal	960	4.00	1,920	8.00	38,868	12.00
TOTAL PROPOSED ACTION	10,232	42.80	28,636	119.40	38,868	162.20
TOTAL AIRCRAFT OPERATIONS	36,318	114.26	88,284	282.82	124,602	397.08

Rotational bomber aircrews will fly two sorties per day, 240 days per year from Andersen AFB. Ten percent of the bomber operations will be accomplished by B-2 aircraft, and 45 percent will be accomplished by B-1 and B-52 bombers. A typical sortie will include a departure from the base, weapons training at a range/training airspace complex, low level terrain avoidance procedures training, anti-ship mining operations, and an arrival at Andersen AFB followed by two closed patterns before termination. It is estimated that about 13 percent of airfield operations for the bombers will occur during nighttime. Since 1990, there has been a persistent rotational presence of bombers at Andersen AFB. Currently, six bombers rotate through Andersen AFB.

Personnel, Household Goods, Equipment, and Aircraft Movement

When fully established, the ISR/Strike capability will increase the population at Andersen AFB by about 3,000 people when combining the additional military, Air Force civilian and contractor, personnel and dependents. The additional 3,000 people on Andersen AFB associated with the proposed ISR/Strike project will increase the base population to approximately 8,900 people. Because of the shortage of skilled labor on Guam, off-base personnel will be expected to increase temporarily to as many as 1,800 workers during construction periods.

It is expected that 650 permanently assigned personnel will be at Andersen AFB for two or three years at a time. Based on a three-year assignment duration, about 220 of the permanently assigned personnel and associated dependents will depart Andersen AFB and Guam by commercial air carrier flights that use Guam International Airport (see Figure 1). The majority of household goods belonging to the permanently assigned personnel will be transported in cargo ships out of Apra Harbor. Based on three rotations per year (each 120 days), and 48 fighters, 6 bombers, and 1,250 personnel per rotation, it is estimated that 3,750 personnel will rotate to/from Andersen AFB annually. Rotational personnel will also travel to and from Guam by contract commercial aircraft.

Conservation Measures

During the consultation process, the Service and the Air Force worked cooperatively to develop ways to reduce impacts to listed species, specifically the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, and Guam rail. The Air Force included conservation measures as part of the proposed action to reduce impacts resulting from the establishment of the proposed ISR/Strike project. The conservation measures correspond to recovery actions outlined in the draft revised Mariana crow (USFWS 2005a) and Guam Micronesian kingfisher (USFWS 2004a) recovery plans and the Guam rail (USFWS 1990a) and Mariana fruit bat (USFWS 1990b) recovery plans. All conservation measures that involve activities on the Refuge Overlay unit will be coordinated with Guam National Wildlife Refuge staff. The following descriptions of the conservation measures for the proposed ISR/Strike project are summarized from the associated Draft EIS (Air Force 2006b). For the purposes of this biological opinion, the conservation measures are grouped into six categories - additional staffing for the conservation program, habitat improvement measures, studies and research, brown treesnake interdiction and control, avoidance and minimization measures, and monitoring.

Additional Staffing – The Air Force will hire a Wildlife Management Specialist by FY08 to carry out day-to-day field operations of the Andersen AFB conservation program. The wildlife management specialist will be supported by other environmental program staff, as well as a number of volunteer conservation officers. The assigned duties of the wildlife management specialist will include: a) oversight of barrier construction in sites detailed in this document; b) acting as coordinator and Andersen AFB point of contact for ungulate eradication efforts; c) day-to-day management of the Andersen AFB recreation ungulate hunting and depredation programs; d) fenceline reconnaissance for maintenance needs; and e) day-to-day coordination with the Service and other resource agencies.

Habitat Improvement – The Air Force adjusted the construction footprint within the Aircraft Staging Area to reduce clearing within areas of relatively intact forest. Adjusting the footprint precludes the clearing of an 8-ha (20-acre) pocket of relatively high quality forest, containing potential Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher habitat.

Coordination with the Service and the Guam Division of Aquatic and Wildlife Resources will be sought to develop a multi-year ungulate control plan in FY08. The plan will be designed to guide Andersen AFB ungulate eradication, depredation, and recreational hunting issues managed by the proposed Wildlife Management Specialist. Consultants, with appropriate and recognized experience, will be used to develop the plan. The plan will be implemented by the proposed Andersen AFB Wildlife Management Specialist, conservation officers, and other management stakeholders. The plan will focus on successful implementation of ungulate eradication within the ungulate enclosure areas (see below) and the reduction of ungulate densities in non-fenced areas. Control and monitoring techniques will be clearly defined in the ungulate control plan.

To offset the loss of habitat from clearing and aircraft operations associated with the proposed action, two areas totaling approximately 200 ha (494 ac) will be fenced to prevent incursion of deer and pigs. Construction of the ungulate enclosure fence will begin in FY10 and be completed by FY13 (see Table 1). An eradication program will be managed by the Wildlife Management Specialist within enclosure areas. The intent of enclosure fencing is to facilitate forest regeneration by eliminating ungulate browsing pressure, so emergent canopy species may be replaced by saplings. Final placement of the enclosure units will be coordinated with the Service (Guam National Wildlife Refuge and Ecological Services) and Guam Division of Aquatic and Wildlife Resources. Further, the Andersen AFB General Plan will be modified to include a special conservation designation for the enclosure areas after the units are finalized. Assuming that cliff lines can serve as effective barriers to ungulate entry, cliff lines will not be fenced. Leveraging cliff lines as barriers will reduce forest clearing and disturbance necessary for fence construction. The proposed enclosure fencing will involve construction of 3,400 m (11,155 ft) of fenceline, using suitable posts and fencing material sufficient to prevent ungulate incursion and to withstand Guam's environmental conditions (e.g., sea spray, high winds, humidity).

The Air Force proposes to reduce impacts to *Tabernaemontana rotensis*, a rare tree species. There are at least 15 locations containing approximately 1,000 *T. rotensis* trees within the ISR/Strike area. The majority of the trees are saplings, and the remaining are mature trees. *Tabernaemontana rotensis* saplings respond well to transplanting. Prior to construction (FY10),

a landscaping crew will remove the saplings and transplant them outside the project area(s). At the same time, a landscaping crew will collect *T. rotensis* seeds for outplanting outside the project area. This will offset the impacts to *T. rotensis* individuals from construction operations within the project areas.

Vegetation plots containing native tree species utilized by Mariana fruit bats and Mariana crows will be established within ungulate exclosure units by FY11. This conservation measure will contribute to existing foraging habitat with native trees important to the Mariana fruit bat and Mariana crow. The finalized list of tree species will be dependent on commercial nursery or herbarium stocks, and will be coordinated with the Service, Guam Division of Aquatic and Wildlife Resources forestry personnel, University of Guam herbarium personnel, and the U.S. Department of Agriculture Natural Resources Conservation Service field office. Supplemental protective fencing to prevent browse pressure within foraging plots will line the perimeter of the foraging plots. Additional management actions within these plots will include herbaceous vegetation control, fenceline maintenance, and quarterly monitoring of outplanting success. The goal of this conservation measure is to improve habitat outside the ISR/Strike project areas for Mariana fruit bats and Mariana crows.

Studies and Research – The Air Force has also committed to a base-wide vegetation survey, funded to begin in FY07. This survey will characterize vegetation composition and structure throughout the forested areas of Andersen AFB. Vegetation surveys of habitat areas for the Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher will be conducted to target management resources for species recovery.

Ungulate management on Andersen AFB will be enhanced by information obtained by ungulate movement studies. This could be done through radio telemetry or newer technologies and specific research related to ungulate management may be suggested in the aforementioned multi-year ungulate control plan to be developed in FY08. Outside experts may need to be contracted by the Air Force to conduct this work but the Air Force's proposed Wildlife Management Specialist will provide technical support for such research activities, including anesthetizing deer and pigs for radio tagging. The proposed Wildlife Management Specialist may also provide technical assistance for dressing of carcasses for stomach content analysis or wildlife disease studies.

In an effort to increase survivorship of Mariana fruit bat pups at the Pati Point colony, the Air Force proposed to provide funding to trap or bait brown treesnakes at the Pati Point roost site. However, due to concern about the efficacy of current control techniques for the proposed effort and the potential impacts of human disturbance, the Air Force will not be undertaking this project using currently available control techniques. Instead, the Air Force will be consulting with the U.S. Department of Agriculture – Animal, Plant, Health Inspection Service – Wildlife Service's National Wildlife Research Center Headquarters in Fort Collins, Colorado to determine the most effective and least disruptive control strategies. Resulting research requirements will be finite projects that will assist in the development or refinement of snake control techniques that will assist in management of Mariana fruit bat roosts through the adaptive management strategy (see "Avoidance and Minimization Measures" below). The scope of work for this effort will be reviewed annually by Andersen Air Force and Service staff with input from the Guam Division

of Aquatic Wildlife Resources staff and U.S. Department of Agriculture – Animal, Plant, Health Inspection Service – Wildlife Services Operations staff. Rapid implementation of brown treesnake research products by management agencies for Mariana fruit bat conservation efforts on Guam is the focus of this effort. The Department of Defense has been funding applied research for brown treesnake control via U.S. Department of Agriculture – Animal, Plant, Health Inspection Service – Wildlife Service’s National Wildlife Research Center since 1992.

Brown Treesnake Interdiction and Control – To prevent brown treesnakes from leaving Guam in any Air Force cargo, vehicles, munitions, household goods, and other items the Air Force will program for and facilitate a 100 percent inspection rate for all of these items departing Guam from Andersen AFB or other sites on Guam where they are staged for departure from Guam (see Appendix C of Air Force 2006b). The Air Force will implement this effort by providing funds to support sustained brown treesnake trapping, capture, and toxicant use efforts by the U.S. Department of Agriculture – Wildlife Services (Wildlife Services) in the vicinity of sites where Andersen AFB cargo, munitions, vehicles, and other items are staged, stored, or packed prior to departing Guam. To insure that adequate funding is available for the 100 percent inspection rate during periods of peak movement of Air Force cargo, vehicles, munitions, household goods, and other items shipped from Guam, the Air Force will develop a mechanism, with Wildlife Services and the Service, that will forecast and program funding with the Air Force’s or Andersen AFB’s annual budgeting cycle to ensure adequate funding is available for Wildlife Services to maintain a 100 percent inspection level for these items at least 18 months in advance. Also, to insure that the orders to inspect cargo meet the Department of Defense’s Defense Transportation Regulations, Chapter 505 protocols of these regulations (Appendix 1) will be incorporated into the Andersen AFB 36 WG Instruction 32-7004, Brown Tree Snake Management. (Appendix C of Air Force 2006b).

The Air Force will also actively seek sustained Department of Defense funding for applied research efforts by the U.S. Department of Agriculture- Wildlife Services-National Wildlife Research Center related to brown treesnake control. The applied research efforts will focus on: 1) developing aerial broadcast techniques for toxicants; 2) development of artificial lures and attractants for brown treesnakes; and 3) development of more cost-effective strategies to control or eliminate brown treesnakes in quarantine and field situations. The research scope and direction of these efforts will be determined by the Air Force, Service, Wildlife Services Operations, and Wildlife Services-National Wildlife Research Center staff through annual and multi-year plans with discrete, finite applied goals. These efforts are expected to increase the effectiveness of the brown treesnake interdiction program, support large-scale snake control programs for listed species, and may reduce the cost of brown treesnake control on Guam.

Finally, to evaluate the effectiveness of the inspection program, the Air Force will have Wildlife Services provide monthly reports on their operations. In addition, the Air Force will review the status of the inspection program quarterly with the Service and Wildlife Services and at the annual brown treesnake meeting in Honolulu, Hawaii. The monthly reports will provide details on which cargo was inspected or un-inspected, potential level of risk of cargo type, and where the cargo was shipped (mainland United States, United States Territories, and Hawaii). The report will also provide a simple explanation of why specific cargo shipments were missed and document all snake detections by canines or other high risk incidents. This report will be

submitted to the Service, Air Force (Pacific Air Forces, Andersen AFB Commander, and Environmental Flight), State of Hawaii (Department of Agriculture and Department of Land and Natural Resources), Commonwealth of the Northern Mariana Islands (Division of Fish and Wildlife), and Air Force Cooperators.

Avoidance and Minimization Measures – To avoid and/or minimize potential project impacts to the Mariana fruit bat and Mariana crow, the Air Force has incorporated the following measures into its project:

- To avoid impacts to nesting Mariana crows, the Air Force will initiate construction activities at the Aircraft Staging Area, Commercial Entry Gate, Truck Inspection Facility, and Ungulate Exclosure areas; and conduct ungulate eradication in the Ungulate Exclosure areas and the Vegetation Assessment outside the Mariana crow breeding season (October to April). In addition, one week prior to clearing vegetation and conducting ungulate eradication, the Air Force will have a biologist (approved by the Service and the Guam Division of Aquatic and Wildlife Resources) survey the proposed project site and adjacent areas to determine if Mariana crows are in the area. If crows are nesting within 300 m (984 ft) of the project site, construction/clearing activities and ungulate eradication within 300 m (984 ft) of the nest will be postponed until the breeding attempt is completed, resulting in either successful fledging or nest failure. The Air Force will also coordinate with the Guam Division of Aquatic and Wildlife Resources during the Vegetation Assessment to postpone vegetation sampling within 300 m (984 ft) of a Mariana crow nesting until the breeding attempt is completed.
- To avoid impacts to foraging Mariana fruit bats, the Air Force will only allow construction activities at the Aircraft Staging Area, Commercial Entry Gate, Truck Inspection Facility, and Ungulate Exclosure areas during the day. In addition, hooded lights will be used outside the Aircraft Staging Area, Commercial Entry Gate and Truck Inspection Facility, and for all streetlights along roads connecting these facilities.
- To avoid impacts to roosting Mariana fruit bats, the Air Force will have a biologist (approved by the Service and Guam Division of Aquatic and Wildlife Resources) survey the Aircraft Staging Area, Commercial Entry Gate, Truck Inspection Facility, and Ungulate Exclosure area and areas within 150 m (492 ft) of these proposed project sites to determine if Mariana fruit bats are in the area. If Mariana fruit bats are observed within 150 m (492 ft) of the project site, construction will be delayed within 150 m (492 ft) of the bat(s) until the bat(s) have left the area.
- To minimize impacts to Mariana fruit bats on Guam if the Pati Point colony roosting location is abandoned for other on-base locations, the Air Force will: 1) increase security patrols utilizing conservation officers and/or base security around newly established roost sites to decrease the likelihood of illegal hunting; 2) close public hunting areas near new roost sites to limit access and decrease the likelihood of illegal hunting; and 3) implement the brown treesnake control, utilizing measures developed for use at roost sites, at newly established roost sites to increase breeding success.
- To minimize impacts to Mariana fruit bats from Rota that may migrate to Guam after a typhoon event on Rota, the Air Force will provide travel assistance for a Service Special Agent to go to Rota after a typhoon event to decrease the likelihood of illegal hunting on Rota.

- To avoid potential impacts to Mariana crows nesting under ground tracks below 305 m (1,000 ft), the Air Force has agreed to increase the altitude of those ground tracks to at least 305 m (1,000 ft) during the Mariana crow breeding season (October to April).

To avoid, minimize, and/or offset potential unknown impacts to any listed species during the life of the project, the Air Force will develop an Adaptive Management Strategy that will incorporate the conservation measures described here and any additional measures that may be needed. The goals of this Adaptive Management Strategy are to minimize and avoid project impacts to listed species and maintain and increase listed species populations on Andersen AFB, including reestablishing Guam Micronesian kingfishers and Guam rails. A formalized written strategy will include the following: a) time frame for completing its implementation phase; b) identification of priority actions; c) methods for minimizing and/or avoiding impacts to listed species; d) definitions of success for proposed impact minimization, avoidance, and offsetting measures; e) methods for monitoring, data tracking, analysis and feedback; f) a cost estimate for plan implementation; and g) a methodology to increase listed species population on Guam.

This formal strategy will be developed by the Air Force and will include an Adaptive Management Team consisting of Air Force, Service (Ecological Services and the Guam National Wildlife Refuge), and Guam Division of Aquatic and Wildlife Resources biologists familiar with the species and their conservation. The Adaptive Management Team will use data collected from the research and monitoring to evaluate impacts caused by the proposed activities and identify additional measures to minimize, avoid, and/or offset those impacts. Potential management measures that may be included in the strategy are: 1) aircraft noise reduction (*e.g.*, modifying ground track location and flight profile of aircraft without creating a flight hazard or noncompliance with the aircraft flight manual and potential efforts to increase populations), 2) threat removal (*e.g.*, controlling brown treesnake populations at Mariana fruit bat roost sites, Mariana crow nests, and Mariana crow breeding territories, and preventing illegal Mariana fruit bat hunting on Andersen AFB), 3) population enhancement (*e.g.*, supporting on-base aspects of Mariana crow aviculture enhancement and reintroduction efforts for listed species), and 4) efforts to establish and maintain Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, and Guam rail populations on Guam.

The Adaptive Management Team will review the progress of the Adaptive Management Strategy annually, and make recommendations to the Air Force as to needed modifications. The Adaptive Management Team may also advise that sections of the written strategy reviewed and improved by appropriate species and conservation experts. The Service and Adaptive Management Team will approve the basic written strategy as well as subsequent changes to ensure it meets the goals of avoidance, minimization, and species recovery efforts. The approved strategy will be incorporated or attached to the Andersen AFB Integrated Natural Resources Management Plan. The Plan's formal updates carry the Service as a signatory under the Sikes Act Improvement Amendments.

The Adaptive Management Team will be formed by February 1, 2007, and will communicate regularly at first to formalize the strategy and then meet annually to evaluate monitoring and research activities. The formal Adaptive Management Strategy is scheduled for completion by September 2007 and will be revised as needed prior to implementation of Phase 2 (approximately September 2013) and Phase 3 (approximately September 2016) of the proposed project.

Monitoring – The Air Force will conduct a multi-year program to monitor Mariana fruit bats and Mariana crows. The goals of this program will be to monitor the status of Mariana fruit bats and Mariana crows and evaluate project impacts on these two species. This program will involve: 1) monitoring Mariana fruit bat numbers at the Pati Point roost site and any additional roost sites established if the Pati Point site is abandoned, 2) monitoring impacts of aircraft overflights on Mariana fruit bats at the Pati Point roost site, 3) monitoring the status of fruit bat(s) that utilize the Aircraft Staging Area site before and after construction, and 4) monitoring impacts of aircraft overflights on Mariana crow nesting success. All monitoring will be conducted by a properly credentialed biologist(s) and final selection will be coordinated with the Service and Guam Division of Aquatic and Wildlife Resources.

The specific methodology utilized for the monitoring will be developed and incorporated into the formal Adaptive Management Strategy by the Adaptive Management Team with input from appropriate species and conservation experts as needed. Additionally, the Service will have final approval of the methodology and actual implementation to ensure the techniques avoid and/or minimize impacts (“take” per the Endangered Species Act) to listed species. Monitoring Mariana fruit bat responses to aircraft overflights will begin prior to the proposed south runway repair project and the first phase of the proposed increase in aircraft operations (FY09) to obtain baseline data on bat responses and will continue, at a minimum, until the project is fully implemented. The Mariana fruit bat(s) utilizing the Aircraft Staging Area site will be monitored prior to clearing the site in FY 08 (see Table 1) and for at least one year after clearing is completed. Mariana crow nest monitoring will begin prior to the first phase of the proposed increase in aircraft operations (FY09) to obtain baseline data on crow responses and will continue, at a minimum, until the proposed project is fully implemented. As noted above, the Adaptive Management Team will use the data collected from these monitoring efforts to evaluate impacts caused by the proposed activities and identify additional measures to minimize, avoid, and/or offset those impacts.

Status of the Species

Mariana Fruit Bat

Species Description – The Mariana fruit bat or flying fox, known as “fanihi” in Chamorro, is a medium-sized fruit bat in the family *Pteropodidae* that weighs 330 to 577 grams (0.66 to 1.15 pounds). Males are slightly larger than females. The underside (abdomen) is black to brown with gray hair interspersed that creates a grizzled appearance. The shoulders (mantle) and sides of the neck are bright golden brown, but may be paler in some individuals. The head varies from brown to dark brown. The well-formed, rounded ears and large eyes give the face a canine appearance.

Listing Status – The Guam population of the Mariana fruit bat was listed as endangered in 1984 (USFWS 1984). However, in 2005 the subspecies was listed as threatened throughout the Mariana archipelago and downlisted to threatened on Guam (USFWS 2005b). On October 28, 2004, approximately 152 ha (376 ac) were designated as critical habitat for the Mariana fruit bat on Guam (USFWS 2004b). All critical habitat for the species is found on the fee simple portion of the Guam National Wildlife Refuge (see Figure 2).

Historic and Current Distribution – This subspecies of *Pteropus mariannus* is endemic to the Mariana archipelago, where it is found on most of the 15 major islands. To the best of our knowledge, there are no records of fruit bats on Uracas, and fruit bats have been observed only once on Farallon de Medinilla.

No known historical records exist to document the status of the Mariana fruit bat prior to the 20th century. Surveys on most or all islands in the archipelago were conducted in 1983 (Wiles, *et al.* 1989), 2000 (Cruz, *et al.* 2000a-f), and 2001 (Johnson 2001). The relatively isolated northern islands support the majority of the fruit bats in the archipelago, but because of their remote location, these islands have not been surveyed as frequently as the southern islands (*i.e.*, Saipan, Tinian, Aguiguan, and Rota). Individual surveys have been conducted on several of the southernmost islands at relatively frequent intervals (*e.g.*, Kessler 2000; Worthington, *et al.* 2001; Wiles and Johnson 2004). Because of the similarity of the methods used by Wiles and others (1989) and Cruz and others (2000a-f), we considered only these two multi-island surveys for purposes of comparison (Table 4). A conservative interpretation of these data indicates a 37 percent decline in fruit bat numbers between 1983 and 2000 among the six northern islands surveyed in both years. The majority of this decline was recorded on two of the three largest northern islands, Anatahan and Pagan, which together harbored roughly 70 percent of the archipelago's fruit bats in the 1980s (Wiles, *et al.* 1989).

On Guam, the sighting of fruit bats was considered to be “not...uncommon” in the 1920s (Crampton 1921). Woodside (1958) reported that in 1958, the Guam population was estimated to number no more than 3,000, although the method used to make this estimate is not known. This estimate had dropped to between 200 and 750 animals by 1995 (Wiles, *et al.* 1995; Wiles 1996). The most recent surveys on Guam put the bat population at fewer than 50 individuals (Aguon, C., pers. comm. 2006).

Ecology – During the day, Mariana fruit bats roost in colonies of a few to over 800 animals (Wiles 1987a; Pierson and Rainey 1992; Worthington and Taisacan 1995). Bats are typically grouped into harems (one male and two to 15 females) or bachelor groups (predominantly males). Some single males reside at the colony's periphery (Wiles 1987a). On Guam, the average estimated sex ratio in one colony varied from 37.5 to 72.7 males per 100 females (Wiles 1982a).

Table 4. Summary of Mariana Fruit Bat Survey Results: Minimum Estimates¹

Island	Area Sq. mi (Sq. km)	Estimated Number of Bats 1983 ²	Estimated Number of Bats 2000 ³
Maug	0.8 (2.0)	<25	not surveyed
Asuncion	2.9 (7.4)	400	not surveyed
Agrihan	18.3 (47.4)	1,000	1,000
Pagan	18.4 (47.7)	2,500	1,500
Alamagan	4.3 (11.0)	0	200
Guguan	1.5 (4.0)	400	350
Sarigan	1.9 (5.0)	125	200
Anatahan	12.5 (32.3)	3,000	1,000
Subtotal (Northern Islands) [Subtotal six islands]		7,450 [7,025]	[4,250]
Saipan	47.5 (122.9)	<50	not surveyed
Tinian	39.3 (101.8)	<25	not surveyed
Aguiguan	2.7 (7.0)	<10	150-200
Rota	37.0 (95.7)	800-1,000	not surveyed
Guam	212.0 (549.0)	425-500	not surveyed
Subtotal (Southern Islands)		1,310-1,585	insufficient data
TOTAL (All Islands)		8,760-9,035	insufficient data

¹ Two of the northern islands are not included in Table 3: *Uracas*, the most northerly, where fruit bats are not known to occur; and *Farallon de Medinilla*, where fruit bats have been observed on only one occasion.

² Wiles, et al. 1989. Dates: August 17-September 10, 1983; 1-4 days/island. Count methods: Evening dispersal counts at colonies; evening station counts of solitary fruit bats.

³ Cruz, et al. 2000a-f. Dates: June 4-August 16, 2000; 7-9 days/island. Count methods: Evening dispersal counts at colonies, evening and morning station counts of solitary fruit bats.

Reproduction in Mariana fruit bats has been observed year-round on Guam (Perez 1972; Wiles 1983) and on Rota; individual females have a single offspring each year (Pierson and Rainey 1992). Wiles (1987a) found no apparent peak in births on Guam, but a peak may occur in May and June on Rota (Glass and Taisacan 1988). Although specific data for the Mariana fruit bat are lacking, female bats of the family *Pteropodidae* have one offspring per year, generally are not sexually mature until at least 18 months of age, and have a gestation period of four to six months (Pierson and Rainey 1992). The average lifespan of this species is unknown; the longevity of a similar species in Australia is four to five years, with a maximum of eight years (Vardon and Tidemann 2000).

Roost sites are an important aspect of the Mariana fruit bat's biology because they are used for sleeping, grooming, breeding, and intra-specific interactions (USFWS 1990b). Published reports of roost sites on Guam indicate these sites occur in mature limestone forest and are found within 100 m (328 ft) of 80 to 180 m (262 to 591 ft) tall cliffines (USFWS 1990b). On Guam, Mariana fruit bats prefer to roost in mature *Ficus* spp. and *Mammea odorata* trees, but will also

roost in other tree species such as *Casuarina equisetifolia*, *Macaranga thompsonii*, *Guetarda speciosa*, and *Neisosperma oppositifolia* (Wheeler and Aguon 1978; Wiles 1981, 1982b). On other islands in the Mariana archipelago, Mariana fruit bats have been observed in secondary forest and *Casuarina equisetifolia* groves (Glass and Taisacan 1988, Worthington and Taisacan 1996, Worthington, *et al.* 2001). Factors involved in roost site selection are not clear, but data from Guam indicate that some sites may be selected for their inaccessibility by humans and, thus, limited human disturbance. Fruit bats will abandon roost sites if disturbed and have been reported to move to new locations up to ten kilometers (km) (six miles [mi]) away (USFWS 1990b).

Several hours after sunset, bats depart their roost sites to forage for fruit and other native and non-native plant materials such as leaves and nectar (USFWS 1990a). This species feeds on a variety of plant material but is primarily frugivorous (Wiles and Fujita 1992). Specifically, Mariana fruit bats forage on the fruit of at least 28 plant species, the flowers of 15 species, and the leaves of two plant species (Wiles and Fujita 1992). Some of the plants used for foraging include *Artocarpus* sp., *Carica papaya*, *Cycas circinalis*, *Ficus* spp., *Pandanus tectorius*, *Cocos nucifera*, and *Terminalia catappa*. Many of these plant species are found in a variety of forested habitats on Guam, including limestone, ravine, coastal, and secondary forests (Stone 1970; Raulerson and Rhinehart 1991). Little is known about their nightly movements, but fruit bats have been observed foraging as far as 12 km (7 mi) from known roosting sites on Guam (Wiles, *et al.* 1995).

Threats – The primary threats to the Mariana fruit bat throughout its range are habitat destruction and modification and illegal hunting (USFWS 2005b). In addition, predation by brown treesnakes threatens the Mariana fruit bat on Guam (USFWS 2005b).

Mariana Crow

Species Description – The Mariana crow, known as “aga” in Chamorro, is a forest dwelling crow in the family *Corvidae*. Males and females look outwardly similar but, on average, females (242 grams [8.5 ounces]) weigh less than males (256 grams [9.0 ounces]; Baker 1951). The adult Mariana crow is black with brown eyes, a slender, black bill, and short visible nasal bristles. With the exception of the occasional brown gloss to its tail, the immature Mariana crow resembles an adult.

Listing Status – The Mariana crow was listed as endangered in 1984 (USFWS 1984). On October 28, 2004, approximately 152 ha (376 ac) were designated as critical habitat for the Mariana crow on Guam, and 2,552 ha (6,033 ac) were designated on Rota (USFWS 2004b). All critical habitat for the species on Guam is found on the fee simple portion of the Guam National Wildlife Refuge (see Figure 2).

Historic and Current Distribution – The Mariana crow is endemic to the two southernmost islands of the Mariana archipelago, Rota and Guam. In 1976, Mariana crows were considered relatively common and widely distributed on Rota (Pratt, *et al.* 1979). The first island-wide survey for the species on Rota in 1982 resulted in a population estimate of 1,318 individuals (Engbring, *et al.* 1986). Subsequent surveys in 1995 and 1998 indicate the population had

declined to 592 individuals and 234 breeding adults, respectively (Fancy, *et al.* 1999; Plentovich, *et al.* 2005).

Mariana crows were once considered abundant and widely distributed throughout Guam (Baker 1951). However, by the mid-1960s, Mariana crows had disappeared from the southern region of Guam, and by the mid-1970s, they were absent from central Guam (Jenkins 1983). By 1981, the population was restricted to northern Guam and consisted of less than 400 individuals (Engbring and Ramsey 1984). Ten years later, in 1991, fewer than 50 individuals were found on Guam (Wiles, *et al.* 1995). Between 1997 and 2003, 26 Mariana crows were translocated from Rota and released on Guam (USFWS 2005a). Currently, the Guam population consists of 11 individuals (Quitigua, J., pers. comm. 2006).

Ecology – Mariana crows are omnivorous and forage at all heights in the forest and on the ground. They have been observed to feed on a variety of native and non-native invertebrates, reptiles, young rats, and bird eggs, as well as on the foliage, buds, fruits, and seeds of at least 26 plant species (Jenkins 1983; Tomback 1986; Michael 1987; USFWS 2005a). Mariana crows likely breed year round. However, peak nesting occurs between August and February on Rota (Morton, *et al.* 1999) and October and April on Guam (Morton 1996). Both parents generally participate in building the nest, incubating the eggs, and rearing the chicks through fledging (Morton, *et al.* 1999). Nest construction typically takes a week and the incubation and nestling periods are approximately from 21 to 23 days and 36 to 39 days, respectively (Morton, *et al.* 1999). Clutch sizes range from one to four eggs, and the number of nestlings average 1.42 (n=50; Morton, *et al.* 1999). In general, Mariana crows only produce a single brood a year but nest failure and other factors lead to multiple nest attempts. On Rota, 32 pairs constructed an average of two nests a year and nested up to seven times in one season (Morton, *et al.* 1999). After fledging, Mariana crows will typically remain in family groups until the following breeding season, but fledgling attendance can vary from 99 to 537 days (Morton, *et al.* 1999).

Historically, the distribution of Mariana crows among habitats was similar on Guam and Rota. Crows were known to use secondary, coastal, ravine, and agricultural forests, including coconut plantations (Seale 1901; Stophet 1946; Marshall 1949; Baker 1951; Jenkins 1983), but all evidence indicates they were most abundant in native limestone forests (Michael 1987; Morton, *et al.* 1999). Mariana crow nests on Guam have been found in 11 tree genera, all but one of which are native, but most nests are located high in emergent *Ficus* spp. or *Elaeocarpus joga* trees (Morton 1996; Aguon, C., Guam Division of Aquatic and Wildlife Resources, unpubl. data). On Rota, crows primarily use both mature and secondary limestone forests (Morton, *et al.* 1999). Of 156 nest sites on Rota, 39 percent and 42 percent were in mature and secondary limestone forest, respectively (Morton, *et al.* 1999). Of 161 nest trees found during 1996-99, 63 percent were of four species: fagot, *Eugenia reinwardtiana*, *Intsia bijuga*, and *Premna obtusifolia* (Morton, *et al.* 1999). Individual nest trees averaged 16.9 centimeters (6.7 inches) diameter at breast height and 8.7 m (28.5 ft) high. Canopy cover over nest sites averaged 93 percent and was never less than 79 percent. Nests were located at least 290 m (950 ft) from the nearest road and 62 m (203 ft) from the nearest forest edge, in areas with forest canopy cover that averaged 93 percent. The distances from edges strongly suggest that nesting crows are sensitive to disturbance by humans (Morton, *et al.* 1999).

On Rota, Morton, *et al.* (1999) found that breeding crows on six study areas averaged one pair per 22 ha (50 ac) of forested habitat, and each territory was dominated by native forest. Pair densities ranged from one per 37 ha (91 ac) in relatively fragmented forest, to as high as one pair per 12 ha (30 ac) in mostly intact limestone forest along a coastal terrace. Territories were aggressively defended from July through January, although established pairs occupied these areas throughout the year.

Threats – The primary threats to the Mariana crow throughout its range are habitat destruction and modification, predation by introduced predators like the brown treesnake, and human persecution (USFWS 2005a).

Guam Micronesian Kingfisher

Species Description – The Guam Micronesian kingfisher, known as “sihek” in Chamorro, is a sexually dimorphic forest kingfisher in the family *Alcedinidae* (Baker 1951). The adult male has a cinnamon-brown head, neck, upper back, and under parts. The lower back, lesser and underwing coverts, and scapular feathers are greenish-blue and the tail is blue. The feet and iris of the eye are brown and the bill is black except for some white at the base of the lower mandible. The female resembles the adult male, but the upper breast, chin, and throat are paler and the remaining underparts and underwing lining are white instead of cinnamon. Males weigh between 51 and 64 grams (1.8 to 2.3 ounces), and females weigh between 58 and 76 grams (2 to 2.7 ounces; Baker 1951, Jenkins 1983).

Listing Status – The Guam Micronesian kingfisher was listed as endangered in 1984 (USFWS 1984). On October 28, 2004, approximately 152 ha (376 ac) were designated as critical habitat for the Guam Micronesian kingfisher on Guam (USFWS 2004b). All critical habitat for this subspecies is found on the fee simple portion of the Guam National Wildlife Refuge (see Figure 2).

Historic and Current Distribution – This subspecies of *Halcyon cinnamomina* is endemic to Guam. The other two subspecies occur on the islands of Pohnpei (*H. cinnamomina reichenbachii*) and Palau (*H. cinnamomina pelwensis*). The Guam Micronesian kingfisher was considered “fairly common” and occurred throughout forested areas on Guam in 1945 (Baker 1951). Populations in southern and central Guam disappeared by the 1980s (Jenkins 1983) and only 3,023 individuals were recorded in 1981 in northern Guam (Engbring and Ramsey 1984). This population subsequently declined rapidly, and by 1985 only 30 individuals were recorded on Guam (Marshall 1989). This subspecies was believed extinct in the wild by 1988 (Wiles, *et al.* 2003).

Between 1984 and 1986, 29 Guam Micronesian kingfishers were captured and sent to zoological institutions in the mainland United States (Hutchins, *et al.* 1996). As of August 2006, the captive population included 77 individuals in 12 captive breeding institutions (International Species Information System 2006).

Ecology – Guam Micronesian kingfishers feed both on invertebrates and small vertebrates, including insects, segmented worms, hermit crabs, skinks, geckoes, and possibly other small vertebrates (Marshall 1949; Baker 1951; Jenkins 1983). This species typically forages by

perching motionless on exposed perches and swooping down to capture prey on the ground (Jenkins 1983). Guam kingfishers will also capture prey from foliage and have been observed gleaning insects from tree bark (Maben 1982).

This subspecies nests in cavities, and breeding activity appears to be concentrated from December to July (Marshall 1949; Baker 1951, Jenkins 1983). Nests have been reported in a variety of trees, including *Ficus* spp., *Cocos nucifera*, *Artocarpus* spp., *Pisonia grandis*, and *Tristiropsis obtusangula* (Baker 1951; Jenkins 1983; Marshall 1989). Pairs may excavate their own nests in soft trees, arboreal termitaria (the nests of termites [*Nasutitermes* spp.]), arboreal fern root masses, or they may utilize available natural cavities such as broken tree limbs (Jenkins 1983; Marshall 1989). Jenkins (1983) observed that some excavated cavities were never used as nesting sites, which suggests that the process of excavating nest sites may be important in pair-bond formation and maintenance.

Both male and female Guam Micronesian kingfishers incubate eggs and brood and feed nestlings (Jenkins 1983). Clutch sizes from wild populations ($n=3$) were either one or two eggs (Baker 1951; Jenkins 1983; Marshall 1989) and clutch sizes of one to three eggs have been reported in the captive population (Bahner, *et al.* 1998). Incubation, nestling, and fledgling periods for populations of Guam Micronesian kingfishers in the wild are unknown. However, incubation and nestling periods of captive birds averaged 22 and 33 days, respectively (Bahner, *et al.* 1998).

Jenkins (1983) reported that the Guam Micronesian kingfishers nested and fed primarily in mature, secondary growth, and, to a lesser degree, in scrub limestone forest. It was also found in coastal strand vegetation containing coconut palm as well as riparian habitat. However, Jenkins (1983) reported it was probably most common along the edges of mature limestone forest. Few data exist about specific kingfisher nest sites in the wild, but in one study in northern Guam, 16 nest sites were correlated with closed canopy cover and dense understory vegetation. In this study, nest cavities were excavated in the soft, decaying wood of large, standing dead trees averaging 43 centimeters (17 inches) in diameter (Marshall 1989). Research on the Pohnpei Micronesian kingfisher indicates that an area of approximately 8 to 10 ha (20 to 25 ac) of mixed forest and open area may be needed to support a pair of kingfishers (Kesler 2006). Kesler (2006) also noted that at least part of this territory included mature forest. However, it should be noted that Micronesian kingfisher territories may differ from Pohnpei Micronesian kingfisher territories due to differences in forest structure on Guam and Pohnpei (Mueller-Dombois and Fosberg 1998).

Threats – The primary threats to the Guam Micronesian kingfisher are habitat destruction and modification, predation by brown treesnakes, and limited population growth in the captive population (USFWS 2004a).

Guam Rail

Species Description – The Guam rail, known as “koko” in Chamorro, is a flightless rail in the family *Rallidae*. Males and females look outwardly similar but, on average, females (212 grams [8 ounces]) weigh less than males (241 grams [9 ounces]; Jenkins 1979). The head, neck, and eye stripe of the Guam rail are brown, and the eyebrow, lower neck and upper breast are grey.

Their lower breast, abdomen, under tail coverts, and tail are blackish with white barrings. Their legs, feet, and iris are brown and their bill is grey.

Listing Status – The Guam rail was listed as endangered in 1984 (USFWS 1984). No critical habitat for this species has been designated.

Historic and Current Distribution – The Guam rail is endemic to Guam. This species was once distributed throughout Guam, but by 1981 the population was reduced to approximately 2,300 birds and only existed in northern Guam (Engbring and Ramsey 1984; USFWS 1990a). In 1983, it was estimated that fewer than 100 individuals remained, and it was considered extinct in the wild by 1987 (Witteman, *et al.* 1990). In 2003, 129 individuals were in captivity in zoological institutions and Guam Division of Aquatic and Wildlife Resources captive propagation facilities (Lynch, C., pers. comm. 2003). Efforts to establish an experimental population on the island of Rota have been underway since 1989 (Beauprez and Brock 1999a). The current population on Rota is estimated to be between 40 and 70 individuals (Wenninger, P., pers. comm. 2005) but it is not self sustaining and requires annual reintroductions.

Ecology – Guam rails are territorial ground nesters that breed year-round (Jenkins 1979; USFWS 1990a); however, peak breeding may occur during the rainy season (July through November) (Perez 1968). Clutches typically consist of three to four eggs, and broods range from one to four chicks (Jenkins 1979). Guam rails are omnivorous but appear to prefer animal matter over vegetable foods (Jenkins 1979). They have been known to eat gastropods, skinks and geckos, insects, carrion, seeds, and palm leaves (Jenkins 1979). This species is primarily believed to prefer secondary vegetation, though it was found in all habitats except wetlands, though savanna and mature forest may have been marginal habitats (Jenkins 1979; USFWS 1990a ; Wenninger, P., pers. comm. 2006).

Threats – The primary threats to the Guam rail are predation by brown treesnakes and feral cats (*Felis catus*) (USFWS 1984; 1990a). Predation by brown treesnakes is believed to be the primary factor in the decline of the species on Guam, and high snake populations on Guam still threaten recovery efforts there. However, feral cat predation has been found to be a major obstacle to efforts to establish an experimental population on Rota and to re-establish a population on Guam (Beauprez and Brock 1999a,b).

Environmental Baseline

The action area for the proposed project includes the proposed sites for facility construction and renovation and all the areas on Andersen AFB covered under the flight lines of aircraft included in the proposed project (see Figure 2). Also, because Mariana fruit bats are believed to fly back and forth between Guam and Rota (Wiles and Glass 1990; Esselstyn, *et al.* 2006), individuals in the Mariana fruit bat population on Rota are also included in the action area since these bats may be impacted by the proposed action if they migrate to Guam.

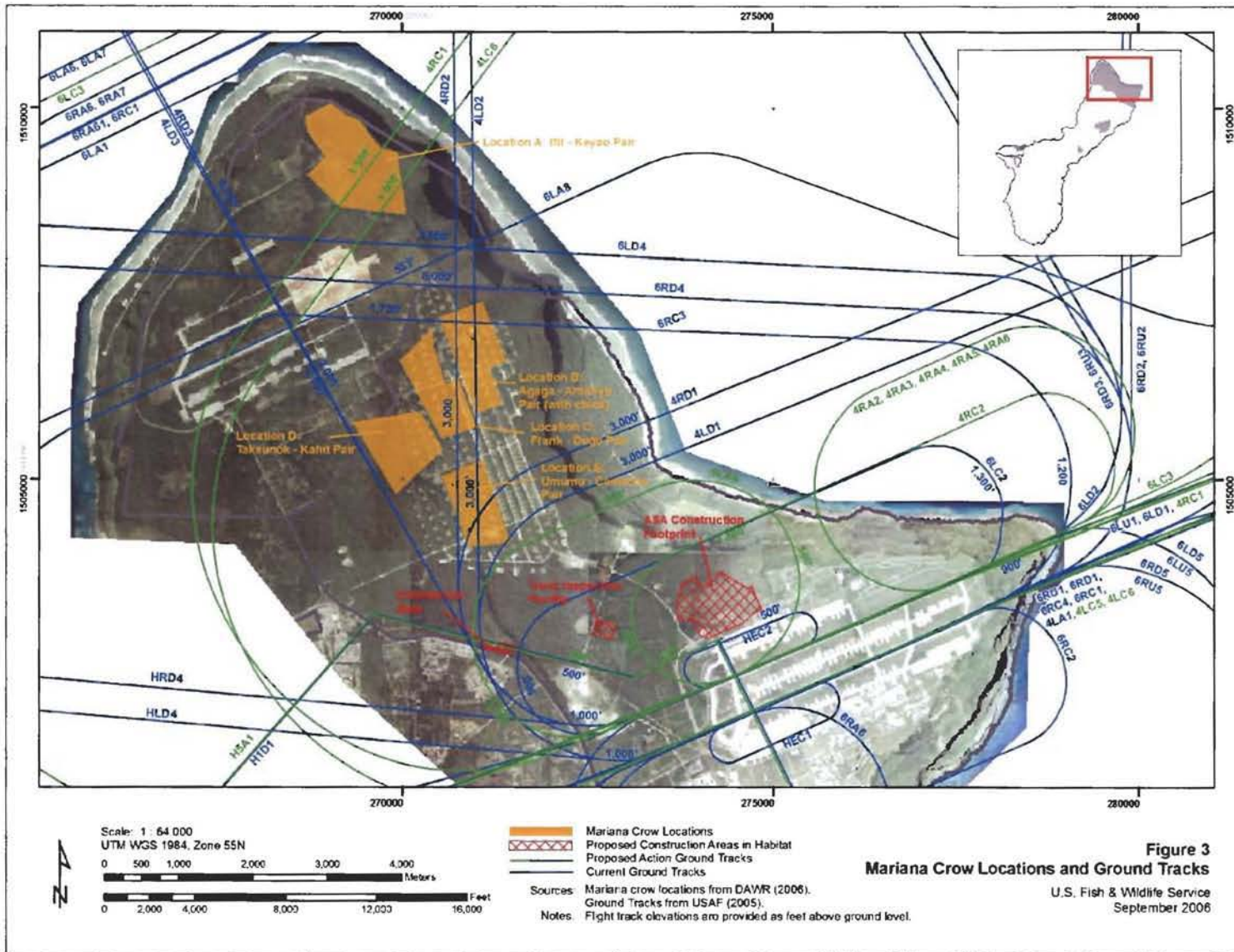
Status of Species in Action Area

Mariana fruit bat - Currently, the Mariana fruit bat colony at Pati Point consists of approximately 30 to 40 individuals (Aguon, C., pers. comm. 2006). The colony has declined severely since the early 1980s when approximately 500 bats were observed at the colony (Wiles 1987a). An unknown number of single bats, potentially juveniles and/or bachelors, roost in forests on Andersen AFB. The bat population on Rota is approximately 550 individuals (Esselstyn, *et al.* 2006). Esselstyn and others (2006) estimated that approximately 100 Mariana fruit bats may have migrated between Rota and Guam after a typhoon in December 2002. Wiles and Glass (1990) estimated that between 225 and 300 have moved between Rota and Guam due to human disturbance or other factors.

As stated in the "Status of the Species" section above, Mariana fruit bats utilize limestone and coastal forest and coconut plantations for foraging and roosting. A detailed assessment of the available Mariana fruit bat habitat on Guam has not been completed. However, using the Donnegan and others (2004) vegetation survey of Guam, limestone forest and plantation forest contain components that Mariana fruit bats utilize for foraging and roosting and may be potential habitat for this species. In 2002, the Service identified approximately 5,803 ha (14,338 ac) in northern Guam as essential habitat for the Mariana fruit bat (USFWS 2002). Utilizing the recent vegetation assessment (Donnegan, *et al.* 2004), it is estimated that approximately 4,867 ha (12,026 ac) of potential Mariana fruit bat habitat is located within these essential habitat areas. Approximately 3,848 ha (9,508 ac) of this habitat is located on Andersen AFB.

Mariana crow – Only 11 Mariana crows are known to occur on Guam, and all are located on Andersen AFB (Quitugua, J., pers. comm. 2006). Nine individuals (four territorial pairs) are located within the Munitions Storage Area, and two individuals (one territorial pair) are located in the northern part of the base near the Guam National Wildlife Refuge (see Figure 3). All of these Mariana crows are located below the flight paths for aircraft associated with this proposed action. However, none of the Mariana crows are located near the proposed Aircraft Staging Area, Commercial Gate, or Truck Inspection Facility areas.

As stated in the "Status of the Species" section above, Mariana crows utilize limestone, secondary, coastal, ravine, and agricultural forests for foraging and nesting. Again, Donnegan and others (2004) vegetation survey of Guam indicates limestone forest and plantation forest contain components that Mariana crows utilize for foraging and nesting and may be potential habitat for this species. In 2002, the Service identified approximately 5,075 ha (12,540 ac) in northern Guam as essential habitat for the Mariana crow (USFWS 2002). Utilizing the recent vegetation assessment (Donnegan, *et al.* 2004), it is estimated that approximately 4,360 ha (10,774 ac) of potential Mariana crow habitat is located within these essential habitat areas. Approximately 3,848 ha (9,508 ac) of this habitat are located on Andersen AFB.



Guam Micronesian kingfisher – The Guam Micronesian kingfisher is currently extinct in the wild and is not found in the action area. However, habitat required to support the recovery of the species is located within the action area. As stated in the “Status of the Species” section above, Guam Micronesian kingfishers are believed to utilize mature limestone forest, secondary forests, and coastal forests dominated by coconut trees for foraging and nesting. A detailed assessment of the available Guam Micronesian kingfisher habitat on Guam has not been completed. However, Donnegan and others (2004) vegetation survey of Guam indicates limestone forest and plantation forest contain components that Guam Micronesian kingfishers utilize for nesting and may be potential breeding habitat for this species. In 2002, the Service identified approximately 5,803 ha (14,338 ac) in northern Guam as essential habitat for the Guam Micronesian kingfisher (USFWS 2002). Utilizing the recent vegetation assessment (Donnegan, *et al.* 2004), it is estimated that approximately 4,867 ha (12,026 ac) of potential Guam Micronesian kingfisher breeding habitat is located within these essential habitat areas. Approximately 3,848 ha (9,508 ac) of this habitat are located on Andersen AFB.

Guam rail – The Guam rail is currently extinct in the wild and is not found in the action area. However, habitat required to support the recovery of the species is located within the action area. As stated in the “Status of the Species” section above, Guam rails are believed to prefer secondary vegetation and forest edges for foraging and nesting. The Donnegan and others (2004) vegetation survey of Guam, indicates limestone forest, scrub forest, limestone scrub forest, and urban cultivated contain components that Guam rails may utilize for foraging and nesting and may be potential habitat for this species. Utilizing the available vegetation, it is estimated that approximately 4,926 ha (20,738 ac) of potential Guam rail habitat is available in northern Guam on the Guam National Wildlife Refuge overlay land. Approximately 3,872 ha (16,301 ac) of this habitat are located on Andersen AFB.

Threats to the Species in Action Area

Many of the threats to the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, and Guam rail in the action area are similar. Therefore, to avoid repetition, these threats are divided into two general categories with information on how each threat impacts each species.

Habitat Loss and Degradation – Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher habitat within the action area is being impacted by feral ungulates, invasive weeds and insects, and typhoons. On Andersen AFB, densities of Philippine deer (*Cervus mariannus*) and feral pigs (*Sus scrofa*) were estimated at 1.8 deer per ha (0.8 deer per acre) and 0.4 pigs per ha (0.2 pigs per acre), some of the highest densities recorded in the world (Knutson and Vogt, unpubl. manuscript). These introduced ungulates are suspected of significantly impacting native floral communities on Andersen AFB by consuming seeds, fruits, and foliage, ingesting or trampling seedlings, and promoting the spread of introduced weeds (Wiles, *et al.* 1999; Wiles 2005). These impacts as well as damage to forests on the base from naturally occurring typhoons and introduced weeds and insects, are degrading the quality of the remaining forest. How this degradation impacts how these forests can sustain Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher populations is unknown.

Habitat for the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, and Guam rail on Andersen AFB will also be impacted by the Air Force’s development of a training area in the

Northwest Field area of the base. The Air Force (2006c) estimates 26 ha (64 ac) of potential Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher habitat will be lost as a result of the training area construction. The Air Force also expects a total of 137 ha (330 ac) of potential Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher habitat may be indirectly impacted by intense training activities and clearing at the training facility. Once the new training area is operational, it is expected that the amount of habitat remaining for the Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher on Andersen AFB will be 4,571 ha (11,295 ac), 4,223 ha (10,435 ac), and 4,571 ha (11,295 ac), respectively. The Guam rail prefers secondary habitat; therefore, the habitat for this species may increase.

Predation – Brown treesnake predation is the primary factor in the decline of the Mariana crow, Guam Micronesian kingfisher, and Guam rail (USFWS 1990a, 2004a, 2005a). Brown treesnake predation on juvenile Mariana fruit bats may also be an important factor in the poor recruitment of this species on Guam (Wiles 1987a; USFWS 2005b). Snake densities within the action area are not known specifically. However, density estimates for snakes over 800 millimeters (31 inches) snout-vent length in tangantangan (*Leucaena leucocephala*) scrub forest on Guam range from 20 to 60 snakes per ha (nine to 26 snakes per acre), while densities in grassland, ravine forest, or native forest vegetation types range from 10 to 20 snakes per ha (four to 9 snakes per ac) (Rodda, *et al.* 1999). These high snake densities continue to hamper recovery efforts for the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, and Guam rail.

In addition to impacts from brown treesnakes, the Mariana fruit bat population in the action area may also be impacted by illegal hunting of adult bats, and Guam rail recovery is limited by feral cat populations in the action area. Illegal hunting at the Pati Point fruit bat colony has not been noted in the last decade. However, opportunistic hunting of solitary bats roosting throughout Andersen AFB is believed to occur in conjunction with legal hunting of feral ungulates (Brooke, A., pers. comm. 2005). Predation of Guam rails by feral cats has been found to be a problem on Rota and Guam (Beauprez and Brock 1999a, b; Wenninger, P., pers. comm. 2006). Experimental reintroduction efforts on Guam determined that cat predation was a major limiting factor to recovery efforts (Beauprez and Brock 1999b; Wenninger, P., pers. comm. 2006).

Conservation Needs of the Species in the Action Area

Due to the similarity in threats to the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, and Guam rail, many of their conservation needs in the action area overlap. Therefore, to avoid repetition, these needs are summarized below for all species.

Reduce Predation – As noted above, brown treesnake predation is considered a primary factor in the decline of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, and Guam rail on Guam. Therefore, large-scale control and/or eradication of brown treesnakes is essential for these species to recover. Guam rail recovery is also limited by feral cat predation on Guam, and large-scale cat control will also be needed to help recover this species. Illegal hunting of Mariana fruit bats is also a major factor in their decline and will need to be controlled to help recover this species. Potential measures for reducing and/or eliminating illegal hunting are increased protection of Mariana fruit bat roosting colonies and individual bats by limiting access to roost sites and foraging areas and increased efforts by law enforcement to reduce illegal hunting.

Protect and Increase Habitat – Habitat loss and degradation are believed to be important factors in the decline of the Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher (USFWS 2004a; 2005 a,b). Protection of the remaining habitat for these species is needed along with efforts to increase the quality of the remaining habitat. Due to the high populations of feral pigs and deer, control and/or eradication of these feral ungulates will help improve the quality of the remaining habitat in the action area. Preventing and controlling introduced insect pests and weeds will also increase the quality of the remaining habitat. Reforestation of degraded areas will also improve the amount of habitat available to support the eventual recovery of these species.

Reintroduction – The recovery criteria for the Mariana crow, Guam Micronesian kingfisher, and Guam rail call for establishing populations of each species in northern Guam (USFWS 1990a, 2004a, 2005a). The Guam Micronesian kingfisher and Guam rail are both extinct in the wild on Guam and will need to be reestablished in northern Guam through reintroduction efforts. The low population of Mariana crows on Guam also requires that additional Mariana crows be translocated from Rota to Guam to help reestablish a stable population in northern Guam.

Ongoing Conservation Actions for the Species in the Action Area

In conjunction with the proposed Northwest Field training facility, the Air Force will construct a 54-ha (133-ac) ungulate exclosure and eradicate ungulates to increase the quality of the habitat for Mariana fruit bats, Mariana crows, and Guam Micronesian kingfishers (Air Force 2006c). The Air Force will also set aside approximately 60 ha (148 ac) of forested land in a new experimental habitat management unit (Air Force 2006c). A brown treesnake exclosure will be constructed around this area and ungulates and other introduced predators will be eradicated from this site to help support listed species recovery efforts on Guam. The Air Force will also be initiating the same native foraging tree planting, ungulate management plan, and Wildlife Management Specialist hiring described in the conservation measures for this project (see Air Force (2006c) and “Project Description” for more information about these measures).

Brown treesnake control measures are currently being undertaken in the Munitions Storage Area on Andersen AFB and around individual Mariana crow nests to help conserve this species. Brown treesnake barriers are currently being applied to all nest trees to limit predation of Mariana crow eggs and chicks (Aguon, *et al.* 2002; Quitigua, J., pers. comm. 2006). Large-scale control of brown treesnakes within the Munitions Storage Area utilizing traps and toxicants has been underway since 2000. This area is currently utilized for releasing hand-reared Mariana crows back into the wild.

The Guam Division of Aquatic and Wildlife Resources is actively managing the remaining Mariana crows on Guam to increase the population. Mariana crows have been released on Guam since approximately 1997 (USFWS 2005a). Eggs were collected on Rota, hand-reared on Guam, and released into the wild on Guam until 2003. Currently, eggs are collected from nesting crows on Guam, hand-reared, and later released on Guam (Quitigua, J., pers. comm. 2006).

Effects of the action

Facilities and Construction

The construction, maintenance, and operation of the proposed Aircraft Staging Area, Commercial Entry Gate, and Truck Inspection Facility are expected to have both direct and indirect impacts on the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and/or their habitats. Direct impacts include habitat loss in areas cleared for construction of the proposed facilities. Indirect impacts include the reduced use of habitat adjacent to the proposed facilities due to auditory and visual disturbance associated with their construction, operation, and maintenance. Many studies have demonstrated that certain species will avoid areas where human disturbance is present (Klein, *et al.* 1995; Reijnen, *et al.* 1995; Gill 1996; Gill, *et al.* 1996; de la Torre, *et al.* 2000; Dyer, *et al.* 2001). The extent of this indirect habitat loss is expected to vary based on the activities at each facility, the quality of habitat adjacent to the proposed facilities, the availability of suitable habitat in other areas, and tolerance of each species to different types of auditory and visual disturbance (Rodgers and Smith 1995; Gill, *et al.* 2001). An assessment of potential direct and indirect loss of habitat for each species is presented below.

Mariana Fruit Bat – Based on the vegetation assessment for the proposed project and the habitat requirements of the Mariana fruit bat, approximately 58 ha (143 ac) of potential foraging and roosting habitat will be lost due to the construction of facilities. Approximately 48 ha (118 ac) of the foraging and roosting habitat is found in the proposed Aircraft Staging Area site while the remaining 10 ha (25 ac) is in the Commercial Entry Gate and Truck Inspection Facility areas.

No studies on Mariana fruit bat habitat use in relation to human disturbance have been conducted. Species may react to human disturbance in a manner similar to how they react to predation risk (Frid and Dill 2002). Therefore, Mariana fruit bat shifts in habitat use based on perceived threats may occur due to the species' history of being hunted (Kitchen, *et al.* 2000; Kilgo, *et al.* 1998). Observations by biologists on Guam indicate that foraging Mariana fruit bats can be fairly tolerant of human disturbance at night if they are not being actively bothered (Wiles, G., pers. comm. 2006). However, this tolerance can vary based upon the type and extent of the disturbance (Wiles, G., pers. comm. 2006) as has been reported in other species (Lafferty 2001; Rees, *et al.* 2005).

Mariana fruit bats primarily forage at night (see "Species Status" above). All construction and maintenance for the proposed facilities will occur during the day and the Commercial Entry Gate and Truck Inspection Facility will only be operational during the day. In addition, the Air Force will be installing shielded lights at the proposed facilities to reduce potential impacts of lighting on foraging bats. Therefore, these activities and proposed facilities are not expected to have severe impacts on foraging Mariana fruit bats, except post-typhoon when food resources may be limited and bats forage during the day (Pierson, *et al.* 1996). Therefore, significant impacts to foraging bats are only expected to occur from the operation of the Aircraft Staging Area facility, which will include aircraft entering and leaving the facility, vehicles, and personnel working in the area.

Observations of foraging individuals indicate that Mariana fruit bats are likely to avoid areas within 100 m (328 ft) of the Aircraft Staging Area facility due to the aircraft noise and moderate human activity at night (Wiles, G., pers. comm. 2006). Currently foraging habitat for the species is available to the north, east, and west of the Aircraft Staging Area facility and approximately 80 ha (197 ac) of potential foraging habitat (*i.e.*, limestone forest; Donnegan, *et al.* 2004) could be impacted by the operation of the facility.

In addition, to foraging habitat, roosting habitat is also expected to be impacted by the construction, maintenance, and operation of the Aircraft Staging Area, Commercial Entry Gate, and Truck Inspection Facility. Observations of roosting bats near construction activities indicate that bats were not disturbed by activities 150 m (492 ft) away from the roost site (Janeke, D., pers. comm. 2006). Currently roosting habitat for the species is available to the north, east, and west of the proposed Aircraft Staging Area site and approximately 93 ha (231 ac) of potential roosting habitat (*i.e.*, limestone forest; Donnegan *et al.* 2004) could be impacted by the operation of the facility. In addition, approximately 35 ha (86 ac) of potential roosting habitat (*i.e.*, limestone forest; Donnegan *et al.* 2004) could be impacted at the Commercial Entry Gate (19 ha, 48 ac) and Truck Inspection Facility (15 ha, 38 ac).

Of the proposed facilities, only the proposed Aircraft Staging Area is known to be occupied by Mariana fruit bats at this time (see “Environmental Baseline” above). Currently, this area is the foraging territory of a female Mariana fruit bat. Since this territory will be cleared as part of the proposed project it is expected that this bat will be forced to establish a new foraging territory in another area. This change in territory may affect the bats reproductive output for the year and/or effect its foraging success until it establishes a new territory. Therefore, we expect that this bat will be adversely impacted by the direct loss of approximately 48 ha (118 ac) of foraging habitat. This adverse impact is expected to result in take through harassment. To help minimize this impact and avoid potential take by killing the bat during clearing, the Air Force will only construct the facilities during the day and will coordinate with the Guam Division of Aquatic and Wildlife Resources and the Guam National Wildlife Refuge to conduct surveys of the project site and adjacent area the week prior to construction/clearing and during construction/clearing to determine if Mariana fruit bats are present in the action area. If Mariana fruit bats are found within 150 m (492 ft) of the project site, the Air Force will postpone construction within 150 m (492 ft) of the bat until the bat has left the area.

In summary, we expect 58 ha (143 ac) of foraging and roosting habitat will be unavailable to the species due to the proposed facilities (Table 4). Approximately 48 ha (118 ac) of the habitat that will be lost includes the known foraging territory of a female Mariana fruit bat. Loss of this habitat is expected to result in take through harm of the female fruit bat. In addition to direct loss of habitat, approximately 80 ha (197 ac) of potential foraging and 128 ha (317 ac) of potential roosting habitat may also be indirectly impacted due to human disturbance and may reduce the quantity of habitat available to support recovery of the species (see Table 4).

Table 4. Estimated Direct and Indirect Habitat Loss for Listed Species Associated with ISR/Strike Project.

Species	Habitat Type	Direct Loss		Indirect Loss		Total Loss	
		Hectares	Acres	Hectares	Acres	Hectares	Acres
Mariana Fruit Bat	Foraging	58	143	80	197	138	340
	Roosting	58	143	128	317	186	460
Mariana Crow	Foraging	58	143	147	363	201	506
	Nesting	58	143	147	363	201	506
Guam Micronesian kingfisher	Foraging	58	143	135	334	193	477
	Nesting	58	143	101	249	159	392
Guam Rail	Nesting and Foraging	23	57	- ¹	-	23	57

¹ Indirect habitat loss was not calculated for the Guam rail due to lack of information on potential impacts of human disturbance on habitat use.

Mariana Crow – Based on the vegetation assessment for the proposed project and the habitat requirements of the Mariana crow, approximately 58 ha (143 ac) of potential foraging and nesting habitat will be lost due to the construction of the proposed facilities. Approximately 48 ha (118 ac) of foraging and nesting habitat is found in the proposed Aircraft Staging Area site while the remaining 10 ha (25 ac) is found in both the Commercial Entry Gate and Truck Inspection Facility areas.

No studies on Mariana crow habitat use in relation to human disturbance have been conducted. However, observations of nesting on Guam and Rota indicate some tolerance of human activities (Morton, *et al.* 1999; Dicke, B., pers. comm. 2005). For example, Mariana crow nests were on average 290 m (n=75, range 25-1,454 m [950 ft, range 82-4,770 ft]) away from paved or graded roads, but only 62 m (n=77, range 0-210 m [203 ft, range 0-689 ft]) from the nearest forest edge on Rota (Morton, *et al.* 1999). Effects of disturbance on Mariana crow foraging are not known; however, their tolerance for human disturbance during foraging may be greater than their tolerance while nesting. Because tolerance of disturbance is affected by the type, duration, and occurrence of the disturbance (Lafferty 2001; Rees, *et al.* 2005) we expect it to vary between the proposed Aircraft Staging Area, Commercial Entry Gate, and Truck Inspection Facility.

Operation activities at the Aircraft Staging Area facility include aircraft entering and leaving the facility, vehicles, personnel working in the area, and lights. This activity is expected to occur during the day and night. Due to the level of disturbance, we expect at a minimum, all habitat within 300 m (984 ft) of the Aircraft Staging Area facility will not be utilized for nesting. Some of this area may be utilized for foraging, but the extent is unknown at this time. Currently, potential foraging and nesting habitat for this species is available to the north, west, and east of the proposed facility; therefore, approximately 135 ha (334 ac) of potential nesting habitat will be impacted by operations of the Aircraft Staging Area facility.

Activities at the Commercial Entry Gate and Truck Inspection Facility will include vehicles entering and leaving and personnel working in the area during the day. No activity is expected at night. Because the level of visual disturbance is high but the auditory disturbance is lower due to the lack of aircraft, we expect that all potential nesting habitat within 60 m (198 ft) of these facilities will not be utilized by nesting Mariana crows. This distance from this disturbance is

less due to the potential cover the intervening forest provides nesting birds from visual disturbance. We therefore calculated approximately 12 ha (29 ac) of potential Mariana crow nesting habitat will be indirectly impacted by the Commercial Entry Gate and Truck Inspection Facility.

As noted in the “Environmental Baseline” section above, the proposed project sites for each facility are not currently known to be occupied by Mariana crows. However, as added measures to help avoid any potential impacts to Mariana crows if the status of the species in the action area should change, the Air Force will initiate construction outside the Mariana crow breeding season (October to April). In addition, the Air Force will coordinate with the Guam Division of Aquatic and Wildlife Resources and the Guam National Wildlife Refuge to conduct surveys of the project site and adjacent area the week prior to construction/clearing and during construction/clearing to determine if Mariana crows are present in the action area. If Mariana crows are nesting within 300 m (984 ft) of the project site, the Air Force will postpone construction within 300 m (984 ft) of the nest until the breeding attempt is completed (*e.g.*, fledging or nest failure).

In summary, we expect 58 ha (143 ac) of potential foraging and nesting habitat will be impacted and unavailable to the species due to the proposed facilities (see Table 4). In addition to direct loss of habitat, approximately 147 ha (363 ac) of potential foraging and nesting habitat will also be indirectly impacted due to human disturbance and made unavailable to support the species (see Table 4). The proposed action areas for the Aircraft Staging Area, Commercial Entry Gate, and Truck Inspection Facility and the areas adjacent to these sites are not currently occupied by Mariana crows. Therefore, we do not expect any adverse effects of the proposed facilities to the population currently found on the base.

Guam Micronesian Kingfisher – Based on the vegetation assessment for the proposed project and the habitat requirements of the Guam Micronesian kingfisher, approximately 58 ha (143 ac) of potential nesting habitat and approximately 74 ha (183 ac) of potential foraging habitat will be lost due to the proposed project. Approximately 48 ha (118 ac) of the nesting and 66 ha (164 ac) of the foraging habitat is found in the proposed Aircraft Staging Area site while the remaining nesting and foraging habitat is found in the Commercial Gate and Truck Inspection Facility areas.

No studies on Micronesian kingfisher habitat use in relation to human disturbance have been conducted. However, anecdotal observations of disturbance impacts on Pohnpei Micronesian kingfisher (*Halcyon cinnamomina reichenbachii*) habitat are available. Dr. Dylan Kesler (pers. comm. 2006) notes that Pohnpei Micronesian kingfishers were sensitive to the presence of human traffic within 100 m (328 ft) when foraging. Nests were also typically 50 to 100 m (164 to 328 ft) away from forest edges, roads, and houses. The impact of noise, like jet aircraft noise, is unknown. However, disturbance distances may be greater due to the impacts of noise on vocalizations (Patricelli and Blickley 2006; Kesler, D., pers. comm. 2006). Based on this information, we estimate that potential foraging and nesting habitat (*i.e.*, limestone forest, urban cultivated) (Donnegan, *et al.* 2004) within 100 m (328 ft) of each facility may be impacted. This is equal to approximately 101 ha (249 ac) of nesting and 135 ha (334 ac) of foraging habitat.

In summary, we expect 58 ha (143 ac) of potential nesting and 74 ha (183 ac) of potential foraging habitat will be impacted and unavailable to support the species due to the proposed facilities (see Table 4). We also estimate that approximately 101 ha (249 ac) of potential nesting and 135 ha (334 ac) of potential foraging habitat may be indirectly impacted by noise (see Table 4). The Guam Micronesian kingfisher is currently extinct in the wild. Therefore, we do not expect any adverse effects of the proposed facilities to individual Guam Micronesian kingfishers.

Guam Rail – Based on the vegetation assessment for the proposed project and the habitat requirements of the Guam rail, approximately 23 ha (57 ac) of potential nesting and foraging habitat will be lost due to the proposed project. Approximately 19 ha (46 ac) of the nesting and foraging habitat is found in the proposed Aircraft Staging Area site while the remaining nesting and foraging habitat is found in the Commercial Entry Gate and Truck Inspection Facility areas.

No studies on Guam rail habitat use in relation to human disturbance have been conducted. The Guam rail is a secretive species, but observations by Paul Wenninger (pers. comm. 2006), the Guam rail biologist for the Guam Division of Aquatic and Wildlife Resources, indicate that rails are tolerant of some human disturbance if sufficient cover is available. This tolerance may vary based on the type, intensity and duration of the disturbance (*e.g.*, aircraft noise versus vehicle traffic) but no information is available to determine if this is the case. Due to the lack of information, we have not calculated indirect habitat loss.

In summary, we expect 23 ha (57 ac) of potential nesting and foraging habitat will be impacted and unavailable to support the recovery of the species due to the construction of the proposed facilities (see Table 4). We did not calculate potential indirect impacts of human disturbance on breeding and foraging habitat (see above for explanation). The Guam rail is currently extinct in the wild. Therefore, we do not expect any adverse effects of the proposed facilities to individual Guam rails.

Aircraft Operations

The proposed project will increase aircraft operations around Andersen AFB, which will increase auditory and visual disturbance to Mariana fruit bats and Mariana crows. In addition, increased air traffic could also lead to a higher incidence of aircraft strikes or an increased chance that an aircraft could crash and impact the Mariana fruit bat colony at Pati Point or a Mariana crow nest. Guam Micronesian kingfishers and Guam rails may also be impacted by increased aircraft operations. However, because these species are extinct in the wild and no studies on aircraft impacts on these species are available or possible, the impacts of these operations are not addressed in this biological opinion. Therefore, only the potential effects of increased aircraft operations on Mariana fruit bats and Mariana crows are described below.

Aircraft Disturbance – Studies on the impacts of aircraft overflights to wildlife have been primarily limited to work on ungulates (*e.g.*, Krausman, *et al.* 1998; Maier, *et al.* 1998; Frid 2003; Landon *et al.* 2003; Krausman *et al.* 2004; Lawler *et al.* 2005) birds of prey (*e.g.*, Andersen, *et al.* 1989; Watson 1993; Trimper, *et al.* 1998; Delaney, *et al.* 1999; Palmer, *et al.* 2003), and waterbirds (*e.g.*, Ward, *et al.* 1999; Conomy, *et al.* 1998 a,b; Komenda-Zehnder, *et al.* 2003). These studies report a wide range of reactions to overflights depending on the biology of the species, its previous exposure to overflights, whether the species is breeding, the type of

aircraft, the altitude of the aircraft, and the lateral distance between aircraft and the species. The variability in these reactions and their specific circumstances make it difficult to be certain how a particular species, such as the Mariana fruit bat or Mariana crow, will react to aircraft overflights. However, there are two broad generalizations about the effects of overflights on wildlife that can be used to help assess potential impacts on the Mariana fruit bat and Mariana crow.

First, individuals with previous exposure to aircraft overflights may display less reaction to overflights than individuals without previous exposure (Andersen, *et al.* 1989, Conomy, *et al.* 1998b). This reduced reaction is believed to be a sign that these individuals have habituated to these overflights. This habituation, however, may be individual or species specific. For example, Conomy and others (1998b) found that black ducks (*Anas rubripes*) became habituated to aircraft noise with continued exposure while wood ducks (*Aix sponsa*) did not become habituated. In addition, the degree of disturbance to which a species can habituate may also be limited (National Park Service 1994).

The second generalization is that an individual's reaction to an overflight may be reduced when the aircraft is farther away than when it is closer (Watson 1993; Delaney, *et al.* 1999; Ward, *et al.* 1999; Komenda-Zehnder, *et al.* 2003). This distance may depend on the species, the type of aircraft, and other variables, so no set standard can be developed for all species. However, once determined for a species, it could be used as a measure to minimize or avoid impacts to that species.

Mariana Fruit Bat

The majority of the fruit bat population on Guam is located in one colony at Pati Point below the north runway of Andersen AFB. The Air Force assessments of flight operations over this area indicate that the number of daily flight operations will increase from approximately two operations to 54 operations. The average daily sound levels for this area will increase from 66 A weighted decibel levels (dBA) to 83 dBA, and the maximum sound levels will increase from 116 dBA to 122 dBA.

Information on the effects of overflights on Mariana fruit bats is primarily limited to a study by Morton (1996) and anecdotal observations by Wiles (1991, 1993, 1994). Behavioral observations collected by Morton (1996) before and after several overflights over the colony indicate that as much as 42 percent of the colony flushed from their roosts and flew for up to five minutes before returning to roost. Morton (1996) also observed that activity 30 minutes after the overflight increased significantly as more bats were alert, agonistic, or moving instead of resting. Sound information gathered at a site adjacent to the colony during overflights ranged from 51 to 116 dBA. Morton (1996) also noted that all overflights that elicited flushing were from four engine aircraft (B-1, C-5, C-141, KC-135, Boeing 747) and not fighter aircraft. However, anecdotal observations by other biologists reported in Morton (1996) and Wiles (1991, 1994) indicate that Mariana fruit bats do respond to fighter aircraft. Wiles (1991, 1994) also notes some circumstantial evidence that the bat colony may have abandoned a former colony site on the east side of Pati Point due to increased aircraft operations associated with training missions. However, no direct correlation can be made.

Since Andersen AFB has been active since 1945, Mariana fruit bats at the Pati Point colony have been exposed to aircraft overflights, and Morton (1996) theorized that they may be habituated, to some degree, to overflights. However, as noted above, bats were still observed flushing from their roosts and reacting to the overflights and may have even abandoned a roost site due to increased aircraft operations associated with training exercises. How Mariana fruit bats will react to an increase in aircraft operations at Andersen AFB due to the proposed project is uncertain. Eventual habituation to overflights and no long-term adverse impacts to Mariana fruit bats is a possible outcome. Alternatively, if bats continue to react to all overflights that may occur it is possible that this could lead to chronic stress which could have long-term impacts on their survival (*e.g.*, reproductive and immune system suppression [Wingfield, *et al.* 1997; Tilbrook, *et al.* 2000]). It is also possible that the colony site will be abandoned due to the increase in aircraft disturbance and be forced to move to another area on Guam or go to the neighboring island of Rota.

Abandonment of roost sites has been observed previously on Guam. From approximately 1981 to 1994, multiple roost sites in northern Guam, including the current site at Pati Point, were abandoned for various reasons, including poor weather conditions (*e.g.*, typhoons), human disturbance (*e.g.*, illegal hunting), and potential disturbance from fighter aircraft training (Wiles 1981, 1983, 1985, 1986, 1987c, 1989, 1990, 1991, 1992, 1994). After abandoning their roost, these bats would often re-form into a colony or colonies at a new roost location or locations after a short period (Wiles 1985). These alternate roost sites were all located along the cliffline in northern Guam on Andersen AFB, though small groups were also observed in other areas. Between 1981 and 1994, some roost sites, including the current site, were reused and abandoned multiple times depending on the level of disturbance or other factors (Wiles 1981, 1983, 1985, 1986, 1987c, 1989, 1990, 1991, 1992, 1994).

Gill and others (2001) noted that the decision of whether an individual moves away from disturbance at their current location is dependent on the quality of the current site, distance to and quality of other suitable sites, the relative risk of predation or density of competitors at different sites, and the investment an individual has made to a site. To assess the likelihood of bats abandoning the current roost site, we examined each of these factors.

The current colony site has been used consistently since 1994 and has been considered a favored site since at least 1981 (Wiles 1987c, 1999). Therefore, we expect this site is currently a high-quality site. However, this quality is expected to change as aircraft operations increase due to the increased number of aircraft flying over the site. The observations of the Mariana fruit bat colony during and immediately after overflights noted above indicate that bats decreased the amount of time they were resting and became more active, for at least a short period, during and after an overflight. At current operation levels, see above, this reaction may occur twice a day. After the proposed project is fully implemented, it could occur as many as 54 times a day (*i.e.*, once per flight operation). This is expected to decrease the quality of this site for fruit bats because it will reduce the amount of time available for the bats to conduct their normal functions of sleeping, grooming, breeding, and intra-specific interactions at the site. This decrease in quality could be sufficient for the bats at this roost site to abandon the roost site.

As noted earlier, alternate roost sites have been utilized along the cliffline at Pati Point and to the west and northwest of Pati Point. The quality of these alternate sites is unknown and is likely dependent on the availability of roost trees at the site and level of human disturbance. We have no information that would indicate that roost trees would not be available at all of these sites or at potential new roost sites. Therefore, we expect roost trees will be available at some sites. Based on the available information, the only change in human disturbance from previous conditions at previous roost sites and the forests along the cliffline are increased aircraft operations. The largest increase in aircraft operations is expected in the areas near the runway; therefore, alternate roost sites to the west and northwest of Pati Point should experience lower aircraft operations than the Pati Point site. Based on this information, we expect that suitable alternate roost sites, other than the Pati Point site, may be available.

No other colonies exist on Guam, so no competition exists for alternate sites. The two main sources of predation for the Mariana fruit bat are illegal hunting and brown treesnake predation of juveniles. It is unlikely that Mariana fruit bats will perceive a difference in the likelihood of predation by brown treesnakes, because the predation events probably occur when the bats are foraging and not at the roost site. Illegal hunting has been observed at many of the alternate roost sites in the past, but it is not known if the bats at the current site have experienced these events. The reuse of sites after poaching events indicates, however, that past experience may not be a major factor in selecting roosts. Therefore, it is uncertain how bats will perceive the likelihood of illegal hunting. The majority of the areas to the west and northwest of Pati Point are undeveloped and probably do not experience a significant level of human activity. However, bats may avoid roosting near Tarague Beach, the rifle and explosive ordnance range, main airfield, and roads connecting these areas because of the level of human activity at these sites and perceived predation risks. Finally, Mariana fruit bats are colonial and therefore do not exert a large amount of energy or time in defending and establishing a new colony site.

Based on the available information we believe the current roost site will likely be abandoned due to the proposed action. This is because: 1) the increase in aircraft operations will reduce the quality of the current site for normal roosting due to increases in bat activity levels throughout the day; 2) alternate sites of sufficient quality are available to the west and northwest of Pati Point; and 3) the current colony site, and other roost sites, have been abandoned in the past due to human disturbance and other factors. This abandonment will, in turn, have several adverse impacts on the Mariana fruit bat population.

First, we believe the bats at the current site will likely move to alternate roost sites to the west and northwest of Pati Point. The records of abandonment of Mariana fruit bats from Guam indicate that the bats have always moved to alternate sites on Guam, primarily roost sites along the northern cliffline. Therefore, we expect the bats to remain on Guam and not migrate to Rota. Because the cliffline areas to the west and northwest of Pati Point are near public hunting areas and roads, we believe these areas are more accessible to humans and therefore, bats roosting in these areas may be subject to illegal hunting. This illegal hunting would likely result in loss of individuals and cause the new roost site to eventually be abandoned. This impact may also be cumulative because roost sites established after an illegal hunting may also be susceptible to illegal hunting because they are expected to be established to the west and northwest of Pati Point. In addition to illegal hunting, juvenile bats may be left behind at roost sites that are

abandoned because they are too heavy for their mother to support. This is also expected to have cumulative adverse impacts on the bat population if each new roost site is abandoned.

The numerical impact of the abandonment of the current roost site on the Guam Mariana fruit bat population is difficult to access due to uncertainties in how many juvenile bats might be abandoned, how many bats might be taken by illegal hunting, and how often illegal hunting and abandonment might occur. Lemke (1992) reported that the preferred method of hunting bats involves approaching a roost and firing buckshot at the colony several times before the bats leave the site. Each shot could kill several bats; therefore, we expect one poaching event may cause the death or injury of at least nine individuals (*i.e.*, three shots and three bats taken per shot). Several incidents of illegal hunting at roost sites along the cliffline in northern Guam occurred between 1981 and 1994 (Wiles 1981, 1983, 1985, 1986, 1987c, 1989, 1990, 1991, 1992, 1994). Therefore, we expect at least two illegal hunting events could occur after the bats abandon the current roost site. Between 10 and 20 percent of the female Guam bats had young (Wiles 1987c, 1989, 1990), and of the female bats on Rota with young, approximately 10 to 14 percent had large young (Wiles 1987c, 1990). Therefore, if we assume half the current population (40 animals) is female, 20 percent of the females have young, and 14 percent are large young that cannot be carried, approximately one juvenile could be left behind when a roost site is abandoned. If three roost sites are abandoned, then up to three juvenile bats could be adversely impacted.

In addition to the Mariana fruit bats at the Pati Point colony, bats from Rota may fly to Guam from Rota after typhoon events due to increased illegal hunting on Rota and/or reduced food availability due to impacts of the storm on fruit bat habitat (Wiles and Glass 1990; Stinson, *et al.* 1992; Pierson, *et al.* 1996; Esselstyn, *et al.* 2006). The first evidence of potential movement of Mariana fruit bats from Rota to Guam occurred in 1979 when a Mariana fruit bat colony of about 225-250 bats was first observed at Pati Point (Wiles 1987a; Wiles and Glass 1990). For several years prior to 1979 the population was estimated to be less than 50 animals (Wheeler and Aguon 1978). In 1981, bat numbers at Pati Point increased from 240 bats to 508 bats, presumably due to hunting activity on Rota (Wiles 1987a; Wiles and Glass 1990). Temporary increases in Mariana fruit bat numbers at the Pati Point colony after typhoons hit Rota were observed in January to May 1988 (Wiles and Glass 1990) and in December 2002 to January 2003 (Esselstyn, *et al.* 2006). The bats that move from Rota to Guam may not have previous exposure to overflights and may be more susceptible to disturbance from overflights. These bats could then move to other areas on Guam or back to Rota where they may be exposed to increased poaching pressure and/or reduced food availability due to the impacts of tropical storms on food resources.

In summary, we believe that the abandonment of the Pati Point roost site by Mariana fruit bats is likely to occur due to the increased aircraft operations under the proposed action. Mariana fruit bats have abandoned the site previously for various reasons and a former roost site at east Pati Point may have been abandoned due to aircraft activity. We expect the current Pati Point colony would relocate to a new site or sites to the west and/or northwest of Pati Point due to the previous use of these areas as roost sites, although the exact location(s) are uncertain due to changes in the forest structure over the past two decades. Due to the accessibility of roost sites to the west and northwest of Pati Point, we believe that one of the new colonized roost sites

could be abandoned because of human disturbance and other factors. In total, we expect up to two roosts to be abandoned and three juveniles and 18 adults to be killed due to the proposed project.

We also believe that Mariana fruit bats that have migrated from Rota to Guam after a typhoon will also be disturbed by increased aircraft activities at Pati Point and will prematurely return to Rota (less than one month after a storm). We believe these bats will be exposed to illegal hunting and/or poor habitat conditions on Rota which could lead to the death of at least nine individuals. We expect this will only occur after a severe storm on Rota and when aircraft operations have increased. We also expect this to only occur while the Pati Point roost site is occupied by bats from Guam because this species is gregarious and previous observations of bats from Rota were noted with existing colonies of bats from Guam. Based on the proposed timeline for the project (see Table 1) and average number of typhoons for Guam over a ten-year period, we believe this is only likely during approximately eight years of the project. Based on the timeframe and annual likelihood of a storm affecting both Guam and Rota (37 years out of the last 50 years) we believe this could occur up to six times. Utilizing estimates of illegal hunting provided above, we believe that up to 36 bats from Rota could be killed by the proposed action.

Mariana Crow

Currently, nine of the remaining 11 Mariana crows on Guam are located in the Munitions Storage Area on Andersen AFB. One pair is also located to the northeast of Northwest Field runways. Information on ground tracks provided by the Air Force indicates that 13 ground tracks pass over or near these locations (see Figure 3). Assessments of altitudes and sound levels for the loudest aircraft that utilize these ground tracks indicate 12 of the flight paths will be at or above 305 m (1,000 ft) above ground level. One ground track over the northern end of the Munitions Storage Area (6LA8, see Figure 3), an approaching flight path for a C-5, is 169 m (553 ft) above ground level. Maximum sound levels for the different flight paths ranged from 70 to 111 dBA, the maximum sound level was for the C-5 aircraft over the lowest above ground level flight path discussed above. Assessments of aircraft operations over or immediately adjacent to the areas currently occupied by Mariana crows indicate operations will increase between 0 and 0.40 times per day under the proposed action. Assessments of operations over unoccupied areas but near occupied areas indicate operations will increase 1.92 and 2.74 times per day along the 6LA6 and 6LD4 ground tracks, respectively, under the proposed action (see Figure 3).

Morton (1996) conducted a study on the potential impact of aircraft overflights on Mariana crows from 1994 to 1995. He found no evidence that aircraft overflights contributed directly to nest abandonment or nest failure during the study. In fact, one nest was constructed within 1 km (0.6 mi) of the north runway during a large aircraft training exercise (Tandem Thrust). However, Morton (1996) did report three observations of Mariana crows reacting to aircraft. One observation was of alarm calling and an increase in vigilant, alert, and standing behavior from an adult attending a nest after an unknown aircraft (76-92 dBA, >305 m [1,000 ft] above ground level) flew over the nest. Another observation was of a Mariana crow returning to a nest while an unidentified cargo aircraft flew overhead. The adult remained standing at the nest and alarm calling for the duration of the overflight (approximately two minutes). No sound levels or altitude was reported for the aircraft. The final observation was of a pair of Mariana crows

responding to six F-16s and four KC-135s (≤ 86 dBA, no altitude reported) departing the base. The pair was observed alarm calling and flying for 12 minutes after the overflights.

In addition to these observations, Morton (1996) also summarized previous observations of Mariana crow and aircraft interactions by other biologists on Guam. The most severe of these interactions was a pair leaving their nest several times in response to a helicopter flying less than or equal to 120 m (400 ft) above the ground. Other observations also included adults flushing from the nest and leaving eggs unattended. In general, the observations of Mariana crows flushing from nests were all due to aircraft below 305 m (1,000 ft) above the ground (see Table 12 of Morton 1996). Mariana crows reacting to aircraft by alarm calling and other minor behaviors were for aircraft above this elevation.

Based on the available information, Morton (1996) concluded that adverse impacts to nesting Mariana crows could occur and recommended that aircraft be restricted to above 305 m (1,000 ft) above ground level over forested areas used by Mariana crows to minimize these impacts. Other studies on nesting bird responses to aircraft indicate that this distance from the nest had only minor impacts to nest success (Andersen, *et al.* 1989; Watson 1993; Delaney, *et al.* 1999; Palmer, *et al.* 2003). For example, Palmer and others (2003) noted subtle differences in male and female peregrine falcon nest attendance due to jet aircraft overflights less than 300 m (984 ft), but it was not enough to affect productivity.

In general, the altitudes of the ground tracks over the current distribution of Mariana crows are at or above the recommended altitude, except for one. Therefore, we do not predict adverse impacts from aircraft along these ground tracks. In addition, the information provided by the Air Force indicates there will only be small increases (less than one a day) in flight operations over these areas. Therefore, we do not expect any adverse impacts from increased flight operations over these areas.

Currently, one ground track near the Mariana crow's current distribution is below the recommended 305 m (1,000 ft) altitude and is utilized by aircraft arriving at Andersen AFB. In addition, several ground tracks located near the ends and northwest side of the runways are below the recommended altitude but are outside the current distribution of Mariana crows. In addition, several ground tracks outside the Mariana crows' current distribution will experience moderate (2 a day) to large (35 a day) increases in aircraft operations which may impact Mariana crow nesting if they move into these areas before the project is fully implemented. Aircraft utilizing these ground tracks may impact Mariana crows nesting below it and cause Mariana crows to not utilize potential breeding habitat under these ground tracks due to aircraft disturbance. To avoid impacts to the current Mariana crow population, the Air Force has agreed to increase the altitude along the ground track for arriving aircraft to the north of the Munitions Storage Area during the Mariana crow breeding season (October to April). Also, because the proposed project is expected to develop over a long period, the Air Force has agreed to develop an Adaptive Management Strategy to avoid, minimize, and/or offset potential impacts to nesting Mariana crows as the project is implemented over time (see "Project Description" above). This strategy will be developed and implemented prior to initiation of Phase 1 of the proposed project when increased air operations are expected. The Service has approval of the Adaptive

Management Strategy to assure implementation of the plan by the Air Force will avoid, minimize, and/or offset impacts to the Mariana crows.

In summary, we expect no adverse impacts to nesting Mariana crows due to the proposed project. The Air Force will avoid utilizing flight lines below 305 m (1,000 ft) during the breeding season (October to April) and will develop an Adaptive Management Strategy with measures to avoid, minimize, and/or offset potential impacts to Mariana crows.

Aircraft Strikes and Crashes – Increased aircraft operations at Andersen AFB could lead to potential aircraft collisions with Mariana crows and Mariana fruit bats as well as provide the potential for an aircraft crash to impact these species. No aircraft collisions with Mariana crows have been reported, but in 1982, a WC-130H struck a fruit bat while departing Andersen AFB at 1815, just after sunset (reported in Morton 1996). No subsequent collisions with Mariana fruit bats have been reported. Sodhi (2002) reported that bird strikes typically occur four to six times per 10,000 aircraft movements. Approximately 54 percent of the bird strikes on military aircraft occur in or near airfields, and 56 percent occur at less than 300 m (984 ft) above the ground (Neubauer 1990). An assessment of the flight tracks for the base indicate that aircraft collisions with Mariana fruit bats and Mariana crows are likely to occur when aircraft are arriving or departing the airfield. Currently Mariana crows are not found in this area so the potential for impact is insignificant. The Mariana fruit bat colony is situated almost directly below the north runway, so the likelihood of collision is higher for this species as they exit and return to their roost site after sunset and before dawn, respectively (USFWS 1990b). Estimates of aircraft operations from the north runway indicate that they are expected to increase by 3.8 operations a day 30 minutes after sunset and 30 minutes before sunrise. Therefore, the increase in operations during the several hour time period when bats are moving to and from the roost site is expected to be lower than 3.8. Because, no collisions between fruit bats and aircraft have been reported since 1982, the bat population is currently small, the expected increase in aircraft operations is small, and the earlier finding that bats are expected to abandon the Pati Point roost site prior to the full increase in aircraft operations under the proposed project (see “Aircraft Disturbance” above) it appears unlikely that collisions would occur; therefore, we believe this impact to be discountable.

An Air Force study found that 61 percent of all aircraft accidents were related to landing operations and 39 percent occurred during takeoff (Air Force 1999). This study also found that fighter and trainer aircraft accounted for 80 percent of the accidents, with large aircraft and helicopters accounting for the remaining 20 percent. The Air Force defines five categories of aircraft flight mishaps; the most relevant is an aircraft crash, which is defined as a Class A mishap due to destruction of the aircraft or damage beyond economical repair. The 10-year average Class A mishap rate for each aircraft associated with the proposed action is 2.04 mishaps every 10 years for F-15s, 0.09 mishaps every 10 years for KC-135s, 2.40 mishaps every 10 years for B-1s, 0.00 mishaps every 10 years for B-2s, and 0.41 mishaps every 10 years for B-52s (Air Force 2006b). No data are available for the Global Hawk UAV or the F-22 (Air Force 2006b).

It is not possible to predict the precise location of an aircraft accident. However, the Air Force (2006b) evaluated the likelihood of an F-15 fighter crashing into the Pati Point colony by using the 10-year average Class A mishap rate for a fighter (2.04); its definable impact area (2.73 ac);

the size of the accident potential zone containing the colony (344 ac); and the percent of accidents within that accident zone (10.1 percent). It is estimated that 0.005 fighter accidents would occur annually in the accident potential zone containing the colony. It is also estimated that the impact area for a fighter crash would equate to approximately 0.6 percent of the accident potential zone. The Mariana fruit bat colony is also limited to an area of several acres in the accident potential zone. Therefore, we conclude that the likelihood of an aircraft crashing directly into the Pati Point colony as a result of the proposed action is very low. The likelihood of an aircraft crashing near the Pati Point colony and adversely impacting the colony as a result of the proposed action is also minimal but a contingency plan will be addressed in the Adaptive Management Strategy.

Personnel, Household Goods, Equipment, and Aircraft Movement

The brown treesnake was believed to have been introduced to Guam in the late 1940s in military goods (Savidge 1987; Rodda, *et al.* 1992). This introduced predator became established on the island and is believed to have caused extirpation of most of the native birds on Guam (Savidge 1987), as well as many other native and non-native animal species (Fritts and Rodda 1998). The snake is an excellent disperser, stowing away in ships and aircraft leaving Guam (Fritts 1988). Efforts are currently being undertaken to prevent snakes from leaving Guam. However, all outgoing cargo and vessels from Guam currently are not fully inspected, and brown treesnakes are found at destinations served from Guam several times a year (Fritts, *et al.* 1999). As a result, brown treesnakes originating from Guam have been recorded in locations as diverse as the neighboring Commonwealth of the Northern Mariana Islands, Hawaii, Diego Garcia, Federated States of Micronesia, Republic of the Marshall Islands, Spain, Texas, and Oklahoma (Fritts, *et al.* 1999; Tummons 2005). Recently, it was also determined that the brown treesnake is now established on the Island of Saipan (Colvin, *et al.* 2005). If the brown treesnake is established elsewhere, similar impacts to those recorded on Guam's wildlife may occur.

The increase in aircraft operating and/or rotating from Andersen AFB is expected to result in an increase in Air Force personnel, household goods, equipment, and cargo coming and going from Guam. Due to the high populations of brown treesnakes on Guam (Rodda, *et al.* 1999) and increased traffic leaving Guam, it is expected that the likelihood of snakes being transported off island to any areas where Air Force goods, cargo, and equipment are transported will also be increased. For example, Hickam AFB on the Island of Oahu, Hawaii is expected to receive Air Force goods, cargo, and equipment from Guam. The endangered Oahu elepaio (*Chasiempis sandwichensis ibidis*) is endemic to the Island of Oahu and is one species that will be susceptible to brown treesnake predation if it became established there.

To prevent the accidental transportation of brown snakes from Guam in Air Force goods, cargo, and equipment, the Air Force will program for and facilitate a 100 percent inspection rate for all cargo, vehicles, munitions, household goods, and other items departing Guam from the Andersen AFB or other sites on Guam where these items are staged for departure (see "Project Description" for additional information). In addition, the Air Force has agreed to develop a mechanism with Wildlife Services and the Service to ensure that funding is available to consistently sustain the 100 percent inspection rate, adequately support sustained brown treesnake trapping, capture, and toxicant use by Wildlife Services in the vicinity of all Air Force items leaving Guam, and will actively seek sustained funding to support applied brown treesnake

research efforts (see “Project Description” above). Due to these efforts, we believe that the potential adverse impacts of the proposed action on listed species found outside Guam (*e.g.*, Oahu elepaio) are insignificant or discountable.

Conservation Measures

Habitat Improvement – The Air Force will eradicate pigs and deer from two ungulate exclosures that incorporate approximately 200 ha (494 ac) of land near the northern tip of Guam to offset the loss of habitat from the proposed project (see Figure 2). In addition, the Air Force will develop a plan to reduce pig and deer populations in non-fenced areas on the base, outplant tree species utilized for foraging by Mariana fruit bats and Mariana crows within the ungulate exclosures, and hire a Wildlife Management Specialist to administer these programs (see “Project Description” above). These proposed measures are expected to increase the quality of existing habitat for the Mariana fruit bat and Mariana crow and habitat for the Guam Micronesian kingfisher which will help offset the impacts the proposed project on these species. The Guam rail primarily utilizes secondary growth areas and is not expected to be negatively or positively impacted by these activities. The proposed ungulate exclosure areas are expected to remove approximately 0.1 ha (0.2 ac) of potential Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, and Guam rail habitat. However, the expected increase in habitat quality within these areas will offset the loss of habitat for the Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher. In addition to habitat loss, the proposed exclosures will be constructed within the territory of one Mariana crow pair and an area that may be utilized by foraging Mariana fruit bats. The process of eradicating ungulates (*e.g.*, gunfire) within these exclosures could disturb nesting Mariana crows and foraging Mariana fruit bats. To avoid or minimize these potential impacts, the Air Force will schedule ungulate eradication in the exclosures during the day and outside the Mariana crow breeding season (October to April) or when Mariana crows are not nesting within 300 m (984 ft) of the exclosure. Based on these measures we conclude that these proposed habitat improvement activities will not adversely affect listed species.

Studies and Research – The Air Force will conduct a vegetation assessment of Andersen AFB and determine brown treesnake control strategies to develop and implement techniques to avoid, minimize, and/or offset impacts of the proposed project on listed species (see “Project Description” above). The vegetation assessment and brown treesnake control strategies could potentially disturb nesting Mariana crows or roosting Mariana fruit bats if researchers are in the area. However, the Air Force has agreed to avoid nesting Mariana crows by conducting the research in crow territories outside the breeding season (October to April) or not conducting research within 300 m (984 ft) of an active nest. The Air Force will also ensure that all snake control strategies will avoid impacts to the Mariana fruit bat colony at Pati Point. In addition, the outcome of these research efforts will be used to benefit these species. Therefore, we do not expect any adverse impacts associated with the brown treesnake control strategies and vegetation assessment.

Brown Treesnake Interdiction and Control – The Air Force will program for and facilitate a 100 percent inspection rate for all cargo, vehicles, munitions, household goods, and other items leaving Guam from Andersen AFB or other sites on Guam where these items are staged for departure (see “Project Description” and for additional information). In addition, the Air Force

has agreed to develop a mechanism with Wildlife Services and the Service to ensure that funding is available to consistently sustain the 100 percent inspection rate, adequately support sustained brown treesnake trapping, capture, and toxicant use by Wildlife Services in the vicinity of all Air Force items leaving Guam, and actively seek sustained funding to support applied brown treesnake research efforts (see “Project Description” above). Mariana crows and Mariana fruit bats may be disturbed by brown treesnake control activities. However, the majority of these activities are occurring in and around developed areas (*e.g.*, airports, cargo holding areas) where Mariana crows and Mariana fruit bats are not expected to occur. Therefore, we expect no adverse effects from these proposed activities on listed species.

Minimization and Avoidance Measures – The Air Force will develop an Adaptive Management Strategy and to implement various measures to avoid, minimize, and/or offset potential project impacts to listed species (see “Project Description” above). The goals of this Adaptive Management Strategy are to minimize and avoid project impacts to listed species and maintain and increase listed species populations on Andersen AFB. Potential management measures that may be included in the Adaptive Management Strategy are: 1) aircraft noise reduction (*e.g.*, modifying ground track location and flight profile of aircraft without creating a flight hazard or noncompliance with the aircraft flight manual and potential efforts to increase populations), 2) threat removal (*e.g.*, controlling brown treesnake populations at Mariana fruit bat roost sites, Mariana crow nests, and Mariana crow breeding territories, and preventing illegal Mariana fruit bat hunting on Andersen AFB), 3) population enhancement (*e.g.*, supporting Mariana crow aviculture enhancement and reintroduction efforts for listed species), and 4) efforts to establish and maintain Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, and Guam rail populations on Guam. The Adaptive Management Strategy will be developed by the Air Force and will include an Adaptive Management Team, which includes the Service, and the Service will have approval regarding changes to the Adaptive Management Strategy to ensure it meets the goals of the consultation. Because the nature of these measures is to reduce, avoid, and/or offset adverse impacts, we expect no adverse impacts to occur from these actions.

Monitoring – The Air Force will conduct a multi-year program to monitor Mariana fruit bats and Mariana crows. The goals of this program are to monitor the status of Mariana fruit bats and Mariana crows and evaluate project impacts on these two species (see “Project Description” above). The specific methodology utilized for the monitoring will be developed and incorporated into the Adaptive Management Strategy by the Adaptive Management Team with input from appropriate species and conservation experts as needed. Because the Service will have final approval for all techniques used in monitoring, we expect no adverse impacts to occur from these actions.

Cumulative effects

Cumulative effects include the effects of future Territory of Guam, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The Service is unaware of any cumulative effects in the project area that may impact Mariana fruit bats, Mariana crows, Guam Micronesian kingfishers, and Guam rails.

Conclusion

After reviewing the current status, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the implementation of the proposed action discussed herein is not likely to jeopardize the continued existence of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, Guam rail, and other off-site species listed under the ESA. This conclusion is based on the following factors for each species.

Mariana Fruit Bat

- 1) The Service's finding of no jeopardy in this biological opinion for the Mariana fruit bat is based in large part on the conservation measures described in the proposed project. Measures that will offset adverse impacts include: 1) ungulate eradication in approximately 200 ha (494 ac) of potential Mariana fruit bat foraging and roosting habitat; 2) reducing ungulate populations on the base outside the proposed exclosure; 3) outplanting of native tree species utilized by foraging Mariana fruit bats; 4) development and implementation of measures to control brown treesnakes at roost site; 5) providing travel assistance for law enforcement on Rota after typhoons; and 6) protecting roost sites from illegal hunting by limiting access.
- 2) Although 1 Mariana fruit bat will be harmed, 21 bats will be killed, and 2 bat colonies will be harassed on Guam and 36 bats on Rota (or 6 premature re-migrations to Rota) will be killed by actions discussed in this biological opinion, the potential effects on Mariana fruit bats have been minimized by incorporating measures to minimize disturbance, injury, and death to Mariana fruit bats due to the proposed activities.
- 3) Additional actions that may be necessary to avoid, minimize, and/or offset potential project impacts on the Mariana fruit bat and to maintain or increase their population will be developed and implemented through the Adaptive Management Strategy and will be based on the best available science with approval by the Service.
- 4) The Air Force actions described in this biological opinion are not anticipated to compromise the conservation and recovery process described for the Mariana fruit bat in the Guam population recovery plan (USFWS 1990b) and designation of critical habitat on Guam (USFWS 2004b). Recovery of the Mariana fruit bat is based on: a) protection of sufficient habitat to support viable populations in the Mariana archipelago, b) eliminating illegal hunting, c) preventing the accidental introduction of brown treesnakes to other islands in the Mariana archipelago, and d) eradicating brown treesnakes on Guam and Saipan. The proposed conservation measures are expected to assist with brown treesnake control efforts and help minimize illegal hunting. The proposed action is expected to result in direct and indirect loss of up to approximately 186 ha (460 ac) of potential Mariana fruit bat habitat in northern Guam. Estimates of current forest cover based on Donnegan and others (2004) within the area identified as essential habitat by the Service (USFWS 2002; 2004b) are approximately 4,730 ha (11,687 ac). This loss of habitat (up to four percent) associated with the proposed action is expected to be partially offset by the Air Force's proposed ungulate control and eradication activities and other measures to avoid impacts to roosting and foraging Mariana fruit bats. In addition, the Guam population currently makes up approximately two percent of the total Mariana fruit bat population and four percent of the population in the southern islands (*i.e.*, Guam, Rota, Aguiguan, Tinian, and Saipan). Consequently, the Service has determined that the

adverse effects to the Mariana fruit bat that may result from the proposed project will not contribute to an appreciable reduction in the likelihood of survival and recovery of the Mariana fruit bat throughout its range.

Mariana Crow

- 1) The Service's finding of no jeopardy in this biological opinion for the Mariana crow is based in large part on the conservation measures described in the proposed project. Measures that will offset adverse impacts include: 1) eradicating ungulates in approximately 200 ha (494 ac) of Mariana crow foraging and nesting habitat; 2) reducing ungulate populations on the base outside the proposed exclosure; and 3) outplanting native tree species utilized by foraging Mariana crows.
- 2) The effects on Mariana crows have been reduced and avoided by incorporating measures to minimize disturbance to Mariana crows from the proposed activities.
- 3) Additional actions that may be necessary to avoid, minimize, and/or offset potential project impacts on the Mariana crow and to maintain or increase their population will be developed and implemented through the Adaptive Management Strategy and will be based on the best available science with approval by the Service.
- 4) The Air Force actions described in this biological opinion are not anticipated to compromise the conservation and recovery process described for the Mariana crow in the draft revised recovery plan (USFWS 2005a) and designation of critical habitat on Guam and Rota (USFWS 2004b). Recovery of the Mariana crow is based on: a) maintaining a population of Mariana crow consisting of 75 territorial pairs on Rota and northern and southern Guam; b) sufficient habitat to sustain populations on Rota and northern and southern Guam; c) preventing the accidental introduction of brown treesnakes to Rota; d) sufficient control of brown treesnakes and other predators to achieve population goals; and e) resolution of Mariana crow and landowner conflicts. The proposed conservation measures are expected to assist with brown treesnake control efforts and improve the quality of existing habitat on Guam. The proposed action is also expected to result in a direct and indirect loss of up to approximately 205 ha (507 ac) of Mariana crow habitat in northern Guam. Estimates of current forest cover based on Donnegan and others (2004) within the area identified as essential habitat by the Service (USFWS 2002, 2004b) are approximately 4,223 ha (10,435 ac). Therefore, approximately 4,018 ha (9,928 ac) of essential Mariana crow habitat will not be affected by the proposed project. Utilizing the maximum Mariana crow territory size reported by Morton and others (1999; 37 ha) on Rota, we estimate that sufficient habitat to support 75 territorial Mariana crow pairs will still be available in northern Guam. In addition, this loss of five percent of the available habitat is expected to be partially offset by the Air Force's proposed ungulate control and eradication activities so total impacts may be less. No take of Mariana crows is expected as a result of the proposed action. Consequently, the Service has determined that the effects to the Mariana crow that may result from the proposed project will not contribute to an appreciable reduction in the likelihood of survival and recovery of the Mariana crow.

Guam Micronesian Kingfisher

- 1) The Service's finding of no jeopardy in this biological opinion for the Guam Micronesian kingfisher is based in part on the conservation measures described in the proposed

project. Measures that will offset adverse impacts include ungulate eradication in approximately 200 ha (494 ac) of potential Guam Micronesian kingfisher foraging and nesting habitat, reducing ungulate populations on the base outside the proposed exclosure, and the Air Force's continued support for reintroducing Guam Micronesian kingfishers to Andersen AFB.

- 2) The Guam Micronesian kingfisher is currently extinct in the wild and no take is expected as a result of the proposed project.
- 3) The Air Force actions described in this biological opinion are not anticipated to compromise the conservation and recovery process described for the Guam Micronesian kingfisher in the revised recovery plan (USFWS 2004a) and designation of critical habitat on Guam (USFWS 2004b). Recovery of the Guam Micronesian kingfisher is based on: a) maintaining two subpopulations (one in northern Guam and one in southern Guam) consisting of 1,000 individuals, b) sufficient habitat to sustain subpopulations in northern and southern Guam, and c) sufficient control of brown treesnakes and other predators to achieve population goals. The proposed conservation measures are expected to assist with brown treesnake control efforts and improve the quality of existing habitat on Guam. The proposed action is also expected to result in direct and indirect loss of up to approximately 159 ha (393 ac) of potential Guam Micronesian kingfisher breeding habitat in northern Guam. Estimates of current forest cover and potential Guam Micronesian kingfisher breeding habitat based on Donnegan and others (2004) within the area identified as essential habitat by the Service (USFWS 2002, 2004b) are approximately 4,730 ha (11,687 ac). Therefore, approximately 4,571 ha (11,295 ac) of essential Guam Micronesian kingfisher breeding habitat will not be affected by the proposed project. Utilizing the Micronesian kingfisher pair territory sizes reported by Kesler (2005) for cooperatively breeding (11 ha; 27 ac) and non-cooperatively breeding (8 ha, 20 ac) kingfishers on Pohnpei and average density reported by Engbring and Ramsey (1984; 0.38 per ha, 0.15 per ac) on Guam, we estimate that sufficient essential habitat to support 1,000 Guam Micronesian kingfishers will still be available in northern Guam. In addition, the four percent loss of potential habitat is expected to be partially offset by the Air Force's proposed ungulate control and eradication activities so total impacts may be less. No take of Guam Micronesian kingfishers is expected as a result of the proposed action. Consequently, the Service has determined that the effects to the Guam Micronesian kingfisher that may result from the proposed project will not contribute to an appreciable reduction in the likelihood of survival and recovery of the Guam Micronesian kingfisher.

Guam Rail

- 1) The Service's finding of no jeopardy in this biological opinion for the Guam rail is based in part on the Air Force's continued support for reintroducing Guam rails to Andersen AFB.
- 2) The Guam rail is currently extinct in the wild on Guam and no take is expected as a result of the proposed project.
- 3) The Air Force actions described in this biological opinion are not anticipated to compromise the conservation and recovery process described for the Guam rail in the recovery plan (USFWS 1990a). Recovery of the Guam rail is based on: a) maintaining

two subpopulations (one in northern Guam and one in southern Guam) consisting of 1,000 individuals; and b) sufficient control of brown treesnakes and other predators to achieve population goals. The Guam rail prefers secondary habitat, which is widely available in northern and southern Guam (Jenkins 1979; Donnegan, *et al.* 2004). Therefore, the direct loss of approximately 23 ha (57 ac) of potential Guam rail habitat is not expected to contribute to an appreciable reduction in the likelihood of survival and recovery of the Guam rail.

Off-site Species

The Service's finding that adverse impacts to species listed under the ESA found outside of Guam are discountable is based the Air Force's commitment to program for and facilitate an 100 percent inspection rate for all cargo, vehicles, munitions, household goods, and other items leaving Guam from Andersen AFB or other sites on Guam where these items are staged for departure from Guam (see "Project Description" for additional information). In addition, the Air Force has agreed to develop a mechanism to ensure that funding is available to consistently sustain the 100 percent inspection rate, adequately support sustained brown treesnake trapping, capture, and toxicant use by Wildlife Services in the vicinity of all Air Force items leaving Guam, and actively seek sustained funding to support applied brown treesnake research efforts (see "Project Description" above).

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including, breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking under the ESA, provided such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Air Force so they become binding conditions of the proposed project for the exemption in Section 7(o)(2) of the ESA to apply. The Air Force has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the Air Force (1) fails to assume and implement the terms and conditions; or (2) fails to require the applicant to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms added to the permit or grant document, the protective coverage of Section 7(o)(2) of the ESA may lapse. To monitor the impact of incidental take, the Air Force must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement [50 CFR 402.14(i)(3)].

Amount or Extent of Take Anticipated

The Service will not refer the incidental take of any migratory bird for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 USC §703-712) if such take is in compliance with the terms and conditions specified herein.

This biological opinion anticipates the following forms of incidental take:

1. The Service anticipates that take of one Mariana fruit bat foraging territory will occur in the form of harm as a result of clearing and construction of the Aircraft Staging Area facility.
2. The Service anticipates that take of 2 Mariana fruit bat colonies and 21 Mariana fruit bats on Guam and 36 Mariana fruit bats from Rota (or 6 premature re-migrations to Rota) will occur in the form of harassment and death as a result of aircraft disturbance associated with overflights and subsequent illegal hunting impacts.
3. The Service anticipates that no take of Mariana crows, Guam Micronesian kingfishers, or Guam rails will occur from the proposed action.

Effect of the Take

The Service has determined in this biological opinion that this level of anticipated take is not likely to jeopardize the continued existence of the Mariana fruit bat.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the Mariana fruit bat:

1. Minimize and avoid impacts of the proposed construction and operation of the Aircraft Staging Area on Mariana fruit bats.
2. Minimize, avoid, and/or offset the impacts of increased aircraft operations on Mariana fruit bats.

Terms and Conditions

To be exempt from the prohibitions of Section 9 of the ESA, the Air Force must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and specify reporting requirements. These terms and conditions are non-discretionary.

1. Minimize and avoid impacts of the proposed construction and operation of the Aircraft Staging Area on Mariana fruit bats.
 - a. One week prior to clearing and during the first week of construction/clearing, the Air Force will have a biologist (whose selection will be coordinated with the Service and Guam Division of Aquatic and Wildlife Resources) survey the proposed project area and areas within 150 m (492 ft) of the proposed project site at night and during the day to determine if Mariana fruit bats are present. If Mariana fruit bats are observed in the project area, the Air Force will notify the Service and the Guam Division of Aquatic and Wildlife Resources within two (2) days of their observation, and construction will be postponed until these bats have left the area and the Service and the Guam Division of Aquatic and Wildlife Resources have been notified.
 - b. No construction activities will occur at night (*i.e.*, between sunset and sunrise).
 - c. Shielded lights will be used on the outside of the Aircraft Staging Area.
 - d. The Air Force will monitor the status of Mariana fruit bats observed within the project site to ensure no additional take of Mariana fruit bats occurs due to construction activities.
 - i. A qualified biologist (whose selection will be coordinated with the Service and Guam Division of Aquatic and Wildlife Resources) must monitor the status of the Mariana fruit bat(s) that utilize the Aircraft Staging Area facility area (at a minimum of every other day) until one (1) year after the construction/clearing in Aircraft Staging Area site is completed. The specific methodology utilized for monitoring will be developed by the Adaptive Management Team with input from appropriate species experts one (1) year prior to the start of clearing activity at the site. The monitoring methodology should include attempting to capture, mark, and attach a radio transmitter to bats that utilize the Aircraft Staging Area at least one (1) month prior to construction/clearing at the project sites. The capture and monitoring of all bats will be conducted by a qualified

biologist (whose selection will be coordinated with the Service and Guam Division of Aquatic and Wildlife Resources), and all activities will be coordinated with the Guam Division of Aquatic and Wildlife Resources and the Guam National Wildlife Refuge.

- ii. A report summarizing the methods and results of the above monitoring efforts shall be sent to the Service's Pacific Islands Fish and Wildlife Office (300 Ala Moana Blvd., Room 3-122, Box 50088, Honolulu, Hawaii 96850) within three (3) months after monitoring is completed. Results will include maps of where individuals were observed before, during, and after construction/clearing.
2. Minimize, avoid, and/or offset the impacts of increased aircraft operations on Mariana fruit bats.
- a. The Air Force will increase patrols by security personnel and conservation officers near all Mariana fruit bat roost sites that are established after the roost site at Pati Point is abandoned.
 - b. The Air Force will modify its public hunting program to ensure that public hunting does not occur near any Mariana bat roosts.
 - c. The Air Force will provide financial assistance to the Service's Law Enforcement Office in Honolulu, Hawaii, to help pay for the travel costs of sending a special agent to Rota after a typhoon to reduce the incidences of illegal hunting on Rota.
 - d. The Air Force will implement the brown treesnake control measures being developed at Mariana fruit bat roosts. The implementation of this measure will be part of the Adaptive Management Strategy and will be developed with us to ensure this measure does not adversely impact Mariana fruit bats.
 - e. The Air Force will monitor the number of Mariana fruit bats at all roost sites to ensure no additional take of Mariana fruit bats occurs due to aircraft operations associated with the proposed project.
 - i. A qualified biologist (whose selection will be coordinated with the Service and Guam Division of Aquatic and Wildlife Resources) must monitor the number of the Mariana fruit bats at all roost sites until one (1) year after the proposed ISR/Strike is fully implemented. Monitoring will occur at a minimum of once a week except after a typhoon event occurs on Rota when monitoring will occur at a minimum of three times a week, for eight (8) weeks after the typhoon, to more accurately monitor potential migration of bats between Rota and Guam. The specific methodology utilized for monitoring will be developed by the Adaptive Management Team with input from appropriate species experts one (1) year prior to the increase in aircraft operations (FY09). The monitoring methodology should include direct counts of Mariana fruit bats at roost sites utilizing a spotting scope at an appropriate distance to avoid impacts to the bats.

- ii. Reports summarizing the methods and results of the above monitoring efforts shall be sent to the Service's Pacific Islands Fish and Wildlife Office (300 Ala Moana Blvd., Room 3-122, Box 50088, Honolulu, Hawaii 96850) every four (4) months until the monitoring is completed. Results will include a table of count results and weekly summary of the number of aircraft operations (by aircraft type) over occupied roost sites.

The Air Force shall inform the Field Supervisor of the Service's Pacific Islands Fish and Wildlife Office in Honolulu, Hawaii in writing of take of any federally listed species within three (3) working days. The depository designated to receive specimens of any Mariana fruit bats and Mariana crows that are killed is the B.P. Bishop Museum, 1525 Bernice Street, Honolulu, Hawaii, 96817 (telephone: 808/547-3511). If the B.P. Bishop Museum does not wish accession to the specimens, the permittee should contact the Service's Division of Law Enforcement in Honolulu, Hawaii (telephone: 808/861-8525; fax: 808/861-8515) for instructions on disposition. The Service's Pacific Islands Fish and Wildlife office (telephone: 808/792-9400) will also be informed within 3 working days of any injured Mariana fruit bats and Mariana crows found and the actions taken.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize its authority to further the purposes of the ESA by carrying on conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service provides the following conservation recommendations:

- a. Recovery of the Mariana fruit bat is dependent on establishing viable populations of Mariana fruit bats in the southern Mariana archipelago. The Island of Aguiguan is currently uninhabited and could support a large Mariana fruit bat population if sufficient habitat is available. Currently the island is being modified by browsing pressure from goats. We recommend that the Air Force lease Aguiguan from the Commonwealth of the Northern Mariana Islands and eradicate goats on the island to help support Mariana fruit bat populations and offset the loss of Mariana fruit bats on Guam.
- b. Recovery of the Mariana fruit bat, Mariana crow, Guam Micronesian kingfisher, and Guam rail is dependent on reducing and/or eliminating brown treesnakes in northern Guam. We recommend that the Air Force develop and implement measures to control brown treesnakes at a landscape level on Andersen AFB to support recovery efforts for these species.
- c. Recovery of the Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher is dependent upon having sufficient habitat to support these species in northern Guam. We recommend that the Air Force eradicate ungulates and implement a native tree reforestation program throughout Andersen AFB to support the recovery of these species.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or that benefit listed species or their habitats, the Service requests notification of the implementation of any conservation recommendation.

REINITIATION-CLOSING STATEMENT

This concludes formal section 7 consultation on this action. As required by 50 CFR § 402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species in a manner or to an extent not considered in this opinion (e.g., Mariana crows are taken as a result of the action or brown treesnakes become established in Hawaii as a result of Air Force activities associated with this proposed action); 3) the agency action is subsequently modified in a manner that causes an effect to the listed species that was not considered in this biological opinion (e.g., conservation measures like 100 percent brown treesnake interdiction are not implemented); or 4) a new species is listed or critical habitat designated that may be affected by this action. In instances where the amount or extent of incidental take is exceeded, any operations causing take must cease pending reinitiation.

As stated in the conclusion of the "Effects of the Action on Listed Species" section (above), the Service's finding of no jeopardy is based in large part on the conservation measures built into the project by the Air Force. Should there be a failure to carry out any or all of the described measures, or if the measures are not effective, or if these measures are modified in any way beyond that accepted by the Service, reinitiation of consultation will be required. We appreciate your cooperation and assistance in helping us prepare this biological opinion. If you have further questions concerning this biological opinion, please contact Fish and Wildlife Biologist Fred Amidon or Consultation Coordinator Patrice Ashfield, of this office at (808) 792-9400.

Sincerely,

A handwritten signature in black ink, appearing to read "Patrick Leonard", with a stylized, flowing script.

Patrick Leonard
Field Supervisor

Literature Cited

- Aguon, Celestino F. 2006. Guam Division of Aquatic and Wildlife Resources, Mangilao, Guam. Personal communication.
- Aguon, C. F., E. W. Campbell, III, and J. M. Morton. 2002. The efficacy of electrical barriers used to protect Mariana crow nests. *Wildlife Society Bulletin* 30:703-708.
- Air Force. 1999. United States Air Force Air Installation Compatible Use Zone (AICUZ) Program Manager's Handbook, March 1, 1999. 123 pp.
- Air Force. 2005. Field survey report, vegetation community mapping, AAFB, Guam. Unpublished Report. 18 pp.
- Air Force. 2006a. Biological Assessment: Establishment and Operation of an Intelligence, Surveillance, and Reconnaissance, and Strike Capability, Andersen Air Force Base, Guam, March 2006. Department of the Air Force, Pacific Air Forces, Hickam Air Force Base, Hawaii. 93 pp.
- Air Force. 2006b. Draft Environmental Impact Statement: Establishment and Operation of an Intelligence, Surveillance, and Reconnaissance, and Strike Capability, Andersen Air Force Base, Guam, April 2006. Department of the Air Force, Pacific Air Forces, Hickam Air Force Base, Hawaii. 309 pp.
- Air Force. 2006c. Draft Environmental Assessment: Beddown of Training and Support Initiatives at Northwest Field, Andersen Air Force Base, Guam, March 2006. Department of the Air Force, Pacific Air Forces, Hickam Air Force Base, Hawaii. 241 pp.
- Air Force and U.S. Fish and Wildlife Service (USFWS). 1994. Cooperative agreement between the U.S. Navy and the U.S. Fish and Wildlife Service for the establishment and management of the Guam national wildlife refuge, Guam. Unpublished Internal U.S. Fish and Wildlife Service Document. 24 pp.
- Andersen, D. E., O. J. Rongstad, and W. R. Mytton. 1989. Response of nesting red-tailed hawks to helicopter overflights. *Condor* 91:296-299.
- Bahner, E. L., A. Baltz, and E. Diebold. 1998. Micronesian Kingfisher Species Survival Plan Husbandry Manual, First Edition. Zoological Society of Philadelphia, Philadelphia. 54 pp.
- Baker, R. H. 1951. The avifauna of Micronesia, its origin, evolution and distribution. *University of Kansas Publication* 3:13-59.
- Beauprez, G. M., and M. K. Brock. 1999a. Establishment of an experimental population of Guam rails on Rota or other islands in the Marianas. Pages 155-163 *in* Annual Report, Fiscal Year 1999. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Beauprez, G. M., and M. K. Brock. 1999b. Establishment of populations of endangered species in snake-free areas. Pages 163-169 *in* Annual Report, Fiscal Year 1999. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Brooke, Anne. 2005. U.S. Fish and Wildlife Service, Guam National Wildlife Refuge, Dededo, Guam. Personal communication.

- Colvin, B.A., M.W. Fall, L.E. Fitzgerald, and L.L. Loope. 2005. Review of brown treesnake problems and control programs: report of observations and recommendations. Unpublished report for U.S. Department of Interior, Office of Insular Affairs and Brown Treesnake Control Committee. 53 pp.
- Conomy, J. T., J. A. Collazo, J. A. Dubovsky, and W. J. Fleming. 1998a. Dabbling duck behavior and aircraft activity in coastal North Carolina. *Journal of Wildlife Management* 62:1127-1134.
- Conomy, J. T., J. A. Dubovsky, J. A. Collazo, and W. J. Fleming. 1998b. Do black ducks and wood ducks habituate to aircraft disturbance? *Journal of Wildlife Management* 62:1135-1142.
- Crampton, H. E. 1921. A journey to the Mariana Islands - Guam and Saipan. *Natural History* 21:127-145.
- Cruz, J., L. Arriola, N. Johnson, and G. Beauprez. 2000a. Wildlife and Vegetation Surveys, Guguan 2000. Technical Report #3. CNMI-DFW, unpublished report. 42 pp.
- Cruz, J., L. Arriola, N. Johnson, and G. Beauprez. 2000b. Wildlife and Vegetation Surveys, Alamagan 2000. Technical Report #4. CNMI-DFW, unpublished report. 39 pp.
- Cruz, J., L. Arriola, N. Johnson, and G. Beauprez. 2000c. Wildlife and Vegetation Surveys, Sarigan 2000. Technical Report # 5. CNMI-DFW, unpublished report. 51 pp.
- Cruz, J., L. Arriola, N. Johnson, and G. Beauprez. 2000d. Wildlife and Vegetation Surveys, Anatahan 2000. Technical Report #6. CNMI-DFW, unpublished report. 48 pp.
- Cruz, J., L. Arriola, N. Johnson, and G. Beauprez. 2000e. Wildlife and Vegetation Surveys, Pagan 2000. Technical Report #7. CNMI-DFW, unpublished report. 66 pp.
- Cruz, J., L. Arriola, N. Johnson, and G. Beauprez. 2000f. Wildlife and Vegetation Surveys, Agrihan 2000. Technical Report #8. CNMI-DFW, unpublished report. 43 pp.
- De la Torre, S., C. T. Snowdon, and M. Bejarano. 2000. Effects of human activities on wild pygmy marmosets in Ecuadorian Amazonia. *Biological Conservation* 94:153-1563.
- Delaney, D. K., T. G. Grubb, P. Beier, L. L. Pater, and M. H. Reiser. 1999. Effects of helicopter noise on Mexican spotted owls. *Journal of Wildlife Management* 63:60-76.
- Dicke, Blaine. 2005. Guam Division of Aquatic and Wildlife Resources, Mangilao, Guam. Personal communication.
- Donnegan, J. A., S. L. Butler, W. Grabowiecki, B. A. Hiserote, and D. Limtiaco. 2004. Guam's forest resources, 2002. Resource Bulletin PNW-RB-243, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon. 32 pp.
- Dyer, S. J., J. P. O'Neill, S. M. Wasel, and S. Boutin. 2001. Avoidance of industrial development by woodland caribou. *Journal of Wildlife Management* 65:531-542.
- Engbring, J., and F. L. Ramsey. 1984. Distribution and abundance of the forest birds of Guam: results of a 1981 survey. U.S. Fish and Wildlife Service FWS/OBS-84/20. 54pp.
- Engbring, J., F. L. Ramsey, and V. J. Wildman. 1986. Micronesian forest bird survey, 1982: Saipan, Tinian, Agiguan, and Rota. U.S. Fish and Wildlife Service. 143pp.

- Esselstyn, J. A., A. Amar, and D. Janeke. 2006. Impact of posttyphoon hunting on Mariana fruit bats (*Pteropus mariannus*). *Pacific Science* 60:531-539.
- Fancy, S. G., M. R. Lusk, and D. J. Grout. 1999. Status of the Mariana crow population on Rota, Mariana Islands. *Micronesica* 32:3-10.
- Frid, A. 2003. Dall's sheep responses to overflights by helicopter and fixed-wing aircraft. *Biological Conservation* 110:387-399.
- Frid, A., and L. Dill. 2002. Human-caused disturbance stimuli as a form of predation risk. *Conservation Ecology* 6:11. [online] URL: <http://www.consecol.org/vol6/iss1/art11>
- Fritts, T. H. 1988. The brown tree snake, *Boiga irregularis*, a threat to Pacific islands. Biological Report 88(31), U.S. Department of Interior, Fish and Wildlife Service, Washington, DC. 36 pp.
- Fritts, T. H. and G. H. Rodda. 1998. The role of introduced species in the degradation of island ecosystems: a case history of Guam. *Annual Review of Ecology and Systematics* 29:113-140.
- Fritts, T. H., M. J. McCoid, and D. M. Gomez. 1999. Dispersal of snakes to extralimital islands: incidents of the brown treesnake (*Boiga irregularis*) dispersing to islands in ships and aircraft. Pages 209-223 in *Problem snake management: the habu and the brown treesnake* (G. H. Rodda, Y. Sawai, D. Chiszar, and H. Tanaka, editors). Cornell University Press, Ithaca, New York. 534 pp.
- Gill, J. A. 1996. Habitat choice in wintering pink-footed geese: quantifying the constraints determining winter site use. *Journal of Applied Ecology* 33:884-892.
- Gill, J. A., W. J. Sutherland, and A. R. Watkinson. 1996. A method to quantify the effects of human disturbance for animal populations. *Journal of Applied Ecology* 33:786-792.
- Gill, J. A., K. Norris, and W. J. Sutherland. 2001. Why behavioural responses may not reflect the population consequences of human disturbance. *Biological Conservation* 97:265-268.
- Glass, P. and E. M. Taisacan. 1988. Marianas fruit bat surveys and research. Pages 1-22 in *Five Year Progress Report, Fiscal Year 1982-87. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Fish and Wildlife, Commonwealth of the Northern Mariana Islands.*
- Hutchins, M., E. Paul, and B. Bahner. 1996. AZA Micronesian Kingfisher Species Survival Plan Action Plan. American Zoo and Aquarium Association. Bethesda, Maryland. 31 pp.
- International Species Information System. 2006. Halcyon cinnamomina cinnamomina, Micronesian kingfisher, August 25, 2006. Available online at <www.isis.org> (accessed 28 August 2006).
- Janeke, Dustin. 2006. University of Guam, Mangilao, Guam. Personal communication.
- Jenkins, J. M. 1979. Natural history of the Guam rail. *Condor* 81:404-408.
- Jenkins, J. M. 1983. The native forest birds of Guam. *Ornithological Monographs* no. 31. 61pp.

- Johnson, N. C. 2001. A survey of Mariana fruit bats in the Mariana Islands, including recent minimum population estimates, July 2001. Unpublished report to the Commonwealth of the Northern Mariana Islands Division of Fish and Wildlife. 41 pp.
- Kesler, Dylan. C. 2006. Virginia Polytechnic Institute and State University, Blacksburg, Virginia. Personal communication.
- Kesler, D. C. 2006. Population demography, resource use, and movement in cooperatively breeding Micronesian kingfishers. Ph.D. dissertation, Oregon State University, Corvallis, Oregon. 215 pp.
- Kessler, C. 2000. Anatahan Island, Commonwealth of the Northern Mariana Islands: feral animals and forest destruction, July 2000. Report prepared by Zoology Unlimited, LLC, for the U.S. Fish and Wildlife Service. 11 pp + appendices.
- Kilgo, J. C., R. F. Labisky, and D. E. Fritzen. 1998. Influence of hunting on the behavior of white-tailed deer: implications for conservation of Florida panther. *Conservation Biology* 12:1359-1364.
- Kitchen, A. M., E. M. Gese, and E. R. Schauster. 2000. Changes in coyote activity patterns due to reduced exposure to human persecution. *Canadian Journal of Zoology* 78:853-857.
- Klein, M. L., S. R. Humphrey, and H. F. Percival. 1995. Effects of ecotourism on distribution of waterbirds in a wildlife refuge. *Conservation Biology* 9:1454-1465.
- Knutson, Kelly, and Scott Vogt. 2003. U.S. Air Force, Anderson Air Force Base, Guam and U.S. Navy, Pearl Harbor, Hawaii. Unpublished manuscript.
- Komenda-Zehnder, S., M. Cevallos, and B. Bruderer. 2003. Effects of disturbance by aircraft overflight on waterbirds – an experimental approach. International Bird Strike Committee, Warsaw 5-9 May 2003.
- Krausman, P. R., M. C. Wallace, C. L. Hayes, and D. W. DeYoung. 1998. Effects of jet aircraft on mountain sheep. *Journal of Wildlife Management* 62:1246-1254.
- Krausman, P. R., L. K. Harris, C. L. Blasch, K. K. G. Koenen, and J. Francine. 2004. Effects of military operations on behavior and hearing of endangered sonoran pronghorn. *Wildlife Monographs* No. 157. 41 pp.
- Lafferty, K. D. 2001. Disturbance to wintering western snowy plovers. *Biological Conservation* 101:315-325.
- Landon, D. M., P. R. Krausman, K. K. G. Koenen, and L. K. Harris. 2003. Pronghorn use of areas with varying sound pressure levels. *The Southwestern Naturalist* 48:725-728.
- Lawler, J. P., A. J. Magoun, C. T. Seaton, C. L. Gardner, R. D. Boertje, J. M. Ver Hoef, and P. A. Del Vecchio. 2005. Short-term impacts of military overflights on caribou during calving season. *Journal of Wildlife Management* 69:1133-1146.
- Lemke, T. O. 1992. History of fruit bat use, research, and, protection in the Northern Mariana Islands. Pages 135-142 *in* Wilson, D.E. and G.L. Graham (eds.), *Pacific Island Flying Foxes: Proceedings of an International Conservation Conference*. U.S. Fish and Wildlife Service Biological Report 90(23).
- Lynch, Colleen. 2003. Lincoln Park Zoo, Chicago, Illinois. Personal communication.

- Maben, A. F. 1982. The feeding ecology of the black drongo (*Dicrurus macrocercus*) on Guam. M.S. thesis. California State University, Long Beach; Long Beach, California. 87 pp.
- Maier, J. A. K., S. M. Murphy, R. G. White, and M. D. Smith. 1998. Response of caribou to overflights by low-altitude jet aircraft. *Journal of Wildlife Management* 62:752-766.
- Marshall, J. T., Jr. 1949. The endemic avifauna of Saipan, Tinian, Guam and Palau. *Condor* 51:200-221.
- Marshall, S. D. 1989. Nest sites of the Micronesian kingfisher on Guam. *Wilson Bulletin* 101: 472-477.
- Michael, G. A. 1987. Notes on the breeding biology and ecology of the Mariana or Guam crow. *Aviculture Magazine* 93:73-82.
- Morton, J. 1996. The effects of aircraft overflights on endangered Mariana crows and Mariana fruit bats at Andersen Air Force Base, Guam. Pearl Harbor: Department of the Navy, Pacific Division, Naval Facilities Engineering Command. 81pp.
- Morton, J. M., S. Plentovich, and T. Sharp. 1999. Reproduction and juvenile dispersal of Mariana Crows (*Corvus kubaryi*) on Rota 1996-1999. U.S. Fish and Wildlife Service Report, Honolulu, Hawaii. 57pp.
- Mueller-Dombois, D. and F. R. Fosberg. 1998. Vegetation of the tropical pacific islands. *Ecological Studies*, Volume 132. Springer-Verlag, New York, New York. 733 pp.
- National Park Service. 1994. Report to Congress: Report on the effects of aircraft overflights on the National Park system, September 12, 1994. [online] URL: <http://www.nonoise.org/library/npreport/intro.htm>
- Neubaur, J. C. 1990. Why birds kill: cross-sectional analysis of U.S. Air Force bird strike data. *Aviation, Space, and Environmental Management* 61:343-348.
- Palmer, A. G., D. L. Nordmeyer, and D. D. Roby. 2003. Effects of jet aircraft overflights on parental care of peregrine falcons. *Wildlife Society Bulletin* 31:499-509.
- Patricelli, G. L., and J. L. Blickley. 2006. Avian communication in urban noise: causes and consequences of vocal adjustment. *Auk* 123:639-649.
- Perez, G. S. A. 1968. Notes on the breeding season of Guam rails (*Rallus owstoni*). *Micronesica* 4:133-135.
- Perez, G. S. A. 1972. Observations of Guam bats. *Micronesica* 8:141-149.
- Pierson, E. and W. Rainey. 1992. The biology of flying foxes of the genus *Pteropus*: A Review. Pages 1-17 in Wilson, D. E. and G. L. Graham (eds.), *Pacific Island Flying Foxes: Proceedings of an International conservation Conference*. U.S. Fish and Wildlife Service Biological Report 90(23).
- Pierson, E. D., T. Elmqvist, W. E. Rainey, and P. A. Cox. 1996. Effects of tropical cyclonic storms on flying fox population on the south Pacific Islands of Samoa. *Conservation Biology* 10:438-451.

- Plentovich, S., J. M. Morton, J. Bart, R. J. Camp, M. Lusk, N. Johnson, and E. Vanderwerf. 2005. Population trends of Mariana crow *Corvus kubaryi* on Rota, Commonwealth of the Northern Mariana Islands. *Bird Conservation International* 15:211-224.
- Pratt, H. D., P. L. Bruner, and D. G. Berret. 1979. America's unknown avifauna: the birds of the Mariana Islands. *American Birds* 33:227-235.
- Quitigua, Jeffrey. 2006. Guam Division of Aquatic and Wildlife Resources, Mangilao, Guam. Personal communication.
- Raulerson, L. and A. Rhinehart. 1991. Trees and shrubs of the Northern Mariana Islands. Coastal Resources Management, Office of the Governor, Commonwealth of the Northern Mariana Islands. 120 pp.
- Rees, E. C., J. H. Bruce, and G. T. White. 2005. Factors affecting the behavioural responses of whooper swans (*Cygnus c. Cygnus*) to various human activities. *Biological Conservation* 121:369-382.
- Reijnen, R., R. Foppen, C. Terbraak, and J. Thissen. 1995. The effects of car traffic on breeding bird populations in woodland. 3: reduction of density in relation to proximity of the main roads. *Journal of Applied Ecology* 32:187-202.
- Rodda, G. H., T. H. Fritts, and P. J. Conry. 1992. Origin and population growth of the brown tree snake, *Boiga irregularis*, on Guam. *Pacific Science* 46:46-57.
- Rodda, G. H., M. J. McCoid, T. H. Fritts, and E. W. Campbell, III. 1999. Population trends and limiting factors in *Boiga irregularis*. Pages 236-253 in *Problem snake management: the habu and the brown treesnake* (G. H. Rodda, Y. Sawai, D. Chiszar, and H. Tanaka, editors). Cornell University Press, Ithaca, New York. 534 pp.
- Rodgers, J. A., and H. T. Smith. 1995. Set-back distance to protect nesting bird colonies from human disturbance in Florida. *Conservation Biology* 9:89-99.
- Savidge, J. A. 1987. Extinction of an island forest avifauna by an introduced snake. *Ecology* 68:660-668.
- Seale, A. 1901. Report of a mission to Guam. Honolulu: Occasional papers of the Bernice P. Bishop Museum 1:17-128.
- Sodhi, N. S. 2002. Competition in the air: birds versus aircraft. *Auk* 119:587-595.
- Stinson, D. W., P. O. Glass, and E. M. Taisacan. 1992. Declines and trade in fruit bats on Saipan, Tinian, Aguijan, and Rota. Pages 61-67 in Wilson, D. E. and G. L. Graham (eds.), *Pacific Island Flying Foxes: Proceedings of an International Conservation Conference*. U.S. Fish and Wildlife Service Biological Report 90(23).
- Stone, B. C. 1970. The flora of Guam. *Micronesica* 6:1-659.
- Stophlet, J. J. 1946. Birds of Guam. *Auk* 53:539-540.
- Tilbrook, A. J., A. I. Truner, and I. J. Clarke. 2000. Effects of stress on reproduction in non-rodent mammals: the role of glucocorticoids and sex differences. *Reviews of Reproduction* 5:105-113.

- Tomback, D. F. 1986. Observations on the behavior and ecology of the Mariana crow. *Condor* 88:398-401.
- Trimper, P. G., N. M. Standen, L. M. Lye, D. Lemon, T. E. Chubbs, and G. W. Humphries. 1998. Effects of low-level jet aircraft noise on the behaviour of nesting osprey. *Journal of Applied Ecology* 35:122-130.
- Tummons, P. 2005. BTS in OK. *Environment Hawaii* 16(4):11.
- [USFWS] U.S. Fish and Wildlife Service. 1984. Endangered and threatened wildlife and plants; Determination of endangered species status for seven birds and two bats of Guam and the Northern Mariana Islands. *Federal Register* 49:33881-33885.
- [USFWS] U.S. Fish and Wildlife Service. 1990a. Native forest birds of Guam and Rota of the Commonwealth of the Northern Mariana Islands Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. 86pp.
- [USFWS] U.S. Fish and Wildlife Service. 1990b. Guam Mariana fruit bat and little Mariana fruit bat recovery plan. U.S. Fish and Wildlife Service, Portland, Oregon. 57pp + Appendix.
- [USFWS] U.S. Fish and Wildlife Service. 2002. Endangered and threatened wildlife and plants; Determinations of prudency for two mammal and four bird species in Guam and the Commonwealth of the Northern Mariana Islands and proposed designations of critical habitat for one mammal and two bird species; proposed rule. *Federal Register* 67:63738-63772.
- [USFWS] U.S. Fish and Wildlife Service. 2004a. Draft revised recovery plan for the sihek or Guam Micronesian kingfisher (*Halcyon cinnamomina cinnamomina*). Portland, Oregon. ix + 99 pp.
- [USFWS] U.S. Fish and Wildlife Service. 2004b. Endangered and threatened wildlife and plants; Designation of critical habitat for the Mariana fruit bat and Guam Micronesian kingfisher on Guam and Mariana crow on Guam and in the Commonwealth of the Northern Mariana Islands; final rule. *Federal Register* 69:62944-62990.
- [USFWS] U.S. Fish and Wildlife Service. 2005a. Draft revised recovery plan for the aga or Mariana crow, *Corvus kubaryi*. Portland, Oregon. x + 147 pp.
- [USFWS] U.S. Fish and Wildlife Service. 2005b. Endangered and threatened wildlife and plants; Mariana Fruit Bat (*Pteropus mariannus mariannus*):reclassification from endangered to threatened in the Territory of Guam and listing as threatened in the Commonwealth of the Northern Mariana Islands. *Federal Register* 70:1190-1210.
- Vardon, M. J. and Tidemann, C. R. 2000. The black flying-fox (*Pteropus alecto*) in north Australia: juvenile mortality and longevity. *Australian Journal of Zoology*, 48: 91-97.
- Ward, D. H., R. A. Stehn, W. P. Erickson, and D. V. Derksen. 1999. Response of fall-staging brant and Canada geese to aircraft overflights in southwestern Alaska. *Journal of Wildlife Management* 63:373-381.
- Watson, J. W. 1993. Responses of nesting bald eagles to helicopter surveys. *Wildlife Society Bulletin* 21:171-178.

- Wenninger, Paul. 2005, 2006. Guam Division of Aquatic and Wildlife Resources, Mangilao, Guam. Personal communication.
- Wheeler, M. E., and C. F. Aguon. 1978. The current status and distribution of the Marianas fruit bat on Guam. Guam Division of Aquatic and Wildlife Resources Technical Report 1:1-29.
- Wiles, G. J. 1981. Movement patterns and habitat utilization of Mariana fruit bats. Pages 167-172 *in* Annual Report Fiscal Year 1981. Guam Aquatic and Wildlife Resources Division, Department of Agriculture, Guam.
- Wiles, G. J. 1982a. The current status, distribution, and natural history of Mariana fruit bats. Pages 204-211 *in* Annual Report Fiscal Year 1982. Guam Aquatic and Wildlife Resources Division, Department of Agriculture, Guam.
- Wiles, G. J. 1982b. Movement patterns and habitat utilization of Mariana fruit bats. Pages 212-216 *in* Annual Report Fiscal Year 1982. Guam Aquatic and Wildlife Resources Division, Department of Agriculture, Guam.
- Wiles, G. J. 1983. The current status, distribution and natural history of Mariana fruit bats. Pages 157-180 *in* Annual Report, Fiscal Year 1982. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Wiles, G. J. 1985. Current status, distribution, and natural history of Marianas fruit bats. Pages 112-123 *in* Annual Report, Fiscal Year 1985. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Wiles, G. J. 1986. Current status, distribution, and natural history of Marianas fruit bats. Pages 111-121 *in* Annual Report, Fiscal Year 1986. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Wiles G.J. 1987a. Current research and future management of Mariana fruit bats (Chiroptera: Pteropodidae) on Guam. *Australian Mammalogy* 10:93-95.
- Wiles, G. J. 1987b. The status of fruit bats on Guam. *Pacific Science* 41:148-157.
- Wiles, G. J. 1987c. Current status, distribution, and natural history of Marianas fruit bats. Pages 124-135 *in* Annual Report, Fiscal Year 1987. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Wiles, G. J. 1989. Current status, distribution, and natural history of Marianas fruit bats. Pages 59-71 *in* Annual Report, Fiscal Year 1989. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Wiles, G. J. 1990. Current status, distribution, and natural history of Marianas fruit bats. Pages 156-165 *in* Annual Report, Fiscal Year 1990. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Wiles, G. J. 1991. Current status, distribution, and natural history of Marianas fruit bats. Pages 123-129 *in* Annual Report, Fiscal Year 1991. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Wiles, G. J. 1992. Current status, distribution, and natural history of Marianas fruit bats. Pages 99-105 *in* Annual Report, Fiscal Year 1992. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.

- Wiles, G. J. 1993. Current status, distribution, and natural history of Marianas fruit bats. Pages 100-107 *in* Annual Report, Fiscal Year 1993. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Wiles, G. J. 1994. Current status, distribution, and natural history of Marianas fruit bats. Pages 90-97 *in* Annual Report, Fiscal Year 1994. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Wiles, G. J. 1996. Current status, distribution, and natural history of Marianas fruit bats. Pages 108-112 *in* Annual Report, Fiscal Year 1996. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Wiles, G. J. 1999. Current status, distribution, and natural history of Marianas fruit bats. Pages 110-114 *in* Annual Report, Fiscal Year 1999. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Aquatic and Wildlife Resources, Guam.
- Wiles, G. J. 2005. Decline of a population of wild seeded breadfruit (*Artocarpus mariannensis*) on Guam, Mariana Islands. *Pacific Science* 59:509-522.
- Wiles, Gary J. 2006. Washington Department of Fish and Wildlife, Olympia, Washington. Personal communication.
- Wiles, G. J., and P. O. Glass. 1990. Interisland movements of fruit bats (*Pteropus mariannus*) in the Mariana Islands. *Atoll Research Bulletin* 343:1-6.
- Wiles, G. J. and M. S. Fujita. 1992. Food plants and economic importance of flying foxes on Pacific Islands. Pages 24-35 *in* Wilson D. E. and G. L. Graham (eds.), *Pacific Island Flying Foxes: Proceedings of an International Conservation Conference*. U.S. Fish and Wildlife Service Biological Report 90(23).
- Wiles, G. J. and N. C. Johnson. 2004. Population size and natural history of Mariana fruit bats on Sarigan, Mariana Islands. *Pacific Science* 58.
- Wiles, G. J., T. O. Lemke, and H. H. Payne. 1989. Population estimates of fruit bats (*Pteropus mariannus*) in the Mariana Islands. *Conservation Biology* 3:66-76.
- Wiles, G. J., C. F. Aguon, G. W. Davis, and D. J. Grout. 1995. The status and distribution of endangered animals and plants in northern Guam. *Micronesica* 28(1):31-49.
- Wiles, G. J., J. Bart, R. E. Beck, Jr, and C. F. Aguon. 2003. Impacts of the brown tree snake: patterns of decline and species persistence in Guam's avifauna. *Conservation Biology* 17:1350-1360.
- Wingfield, J. C., K. Hunt, C. Breuner, K. Dunlap, G. S. Fowler, L. Freed, and J. Lepson. 1997. Environmental stress, field endocrinology, and conservation biology. Pages 95-131 *in* Clemmons, J. R., and R. Buchholz (Editors), *Behavioral Approaches to Conservation in the Wild*. Cambridge University Press, Cambridge, UK.
- Witteman, G. J., R. E. Beck, S. L. Pimm, and S. R. Derrickson. 1990. The decline and restoration of the Guam rail, *Rallus owstoni*. *Endangered Species Update* 8:36-39.
- Woodside, D.H. 1958. Fish and wildlife investigations. Guam, Department of Agriculture. Unpublished.

- Worthington, D. J. and E. M. Taisacan. 1995. Fruit bat research. Pages 5-12 *in* Annual Report, Fiscal Year 1994. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Fish and Wildlife, Commonwealth of the Northern Mariana Islands.
- Worthington, D. J., and E. M. Taisacan. 1996. Fruit bat research. Pages 6-17 *in* Annual Report, Fiscal Year 1995. Pittman-Robertson Federal Aid in Wildlife Restoration Program. Division of Fish and Wildlife, Commonwealth of the Northern Mariana Islands.
- Worthington, D.J., A.P. Marshall, G.J. Wiles, and C. Kessler. 2001. Abundance and management of Mariana fruit bats and feral ungulates on Anatahan, Mariana Islands. *Pacific Conservation Biology* 7:134-42.

Appendix 1
Department of Defense Transportation Regulations 505 and 506

CHAPTER 505

AGRICULTURAL CLEANING AND INSPECTION REQUIREMENTS

A. SCOPE

1. This chapter prescribes procedures, assigns responsibilities, and defines requirements for the prevention of the introduction of agricultural pests into the US by the DOD. Destructive pests such as gypsy moths, brown tree snakes, several varieties of snails, and other species can hitchhike on military equipment and personal effects. Foreign soil attached to equipment can harbor pests and animal diseases. These pests can cause immense damage to America's natural resources, destroy crops, and disrupt the export of agricultural commodities.
2. Foreign agricultural restrictions are specified by country in appropriate chapters of this regulation, however the same general responsibilities of DOD activities for the prevention of agricultural pest movements apply to export shipments from the US to foreign countries as well as on imports to the US.

B. POLICY

It is the policy of the DOD that all organizations and personnel involved in the movement of DOD-sponsored cargo, personal property, and accompanied baggage will take those steps necessary to prevent the spread of agricultural pests from one location to another. This includes movement not only across national borders, but any movement that has the potential to introduce invasive species to a new area. It includes shipments from DOD installations and vendor locations by both military and commercial carriers.

C. RESPONSIBILITIES

1. Office of the Deputy Under Secretary of Defense (Environmental Security) (DUSD (ES)) is responsible for furnishing technical guidance and recommendations to the DOD on means of preventing the return of quarantine pests and organisms that may disrupt agriculture and the natural ecosystem.
2. USDA APHIS is responsible to provide guidance, informational materials, and to conduct training for DOD personnel. APHIS will provide personnel to assist in pre-clearances and to train DOD personnel for inspection, cleaning, and disinfecting of material and personnel. APHIS and the DOD will establish reimbursable agreements as required to accomplish this mission. APHIS is the final authority on the pest risk status of material.
3. Unit commanders are responsible for ensuring that the requirements specified in this chapter are met and that procedures are followed to prevent agricultural pests from entering the US when that unit is returning personnel and/or equipment to the US.
4. Port and transportation commanders will ensure that the requirements specified in this chapter are met and that procedures are followed. They will not allow the movement of cargo or cargo containers from their facilities unless they are apparently free of soil, pest infestation, and prohibited agricultural items.

D. REQUIREMENTS

1. All personnel involved in the movement of ships, aircraft, personnel, cargo (including ordnance), containers, packing material, POVs, personal property and Army/Air Force/Navy Post Office (APO/FPO) mail will assure the following requirements are satisfied prior to that movement:
 - a. Baggage. Baggage of all crew, passengers, or troops will be presented for inspection by USDA officers or designees. Commanders must ensure crew, passengers and troops are instructed not to carry prohibited plant and animal material. Foot and web gear of all personnel is also required to be soil and pest free.
 - b. Cargo. Cargo will not be loaded aboard any conveyance in a foreign country, for movement to the US, unless it is free of animal and plant contamination or pest infestations as required by the USDA.
 - c. Packing Material. All wood packing material, dunnage, pallets and crating, must be soil and bark free and apparently free of pest infestations.
 - d. Stores. Stores and in-flight meals are prohibited entry into the US and must be disposed or safeguarded IAW with USDA requirements upon entry.
 - e. Garbage. Garbage will be placed in tight, leak proof, covered containers and disposed of following port procedures authorized by, or under surveillance of the USDA representative. Disposal facilities to incinerate or sterilize must be available before military conveyances will be allowed landing or docking at a US base or port.
 - f. Containers and Pallets. Cargo containers/pallets will not be stored directly on bare ground unless provisions are made to clean the containers/pallets of soil and pests before movement.
2. Detailed cleaning and inspection procedures can be found in the Armed Forces Pest Management Board Technical Guide No. 31, Contingency Retrograde Washdowns: Cleaning and Inspection Procedures. This document is available on the following web site URL:
<http://www.afpmb.org/pubs/tims/tim31.htm>.

E. REQUEST FOR MCI-E PROGRAMS FOR AGRICULTURAL INSPECTIONS

APHIS allows for MCI-E programs at selected bases in the US. These bases are usually remote from local APHIS offices or receive low risk conveyances or shipments. In these programs, APHIS trains and certifies local DOD personnel to do inspections for APHIS. If a base commander is interested in establishing a program, the local APHIS should be contacted at USDA APHIS PPQ, Port Operations, 4700 River Rd., Riverdale, Md. 20737-5000. Telephone number: 301 734-8295. APHIS HQ can supply contact telephone numbers.

F. ARMED FORCES PEST MANAGEMENT BOARD

The Armed Forces Pest Management Board (AFPMB) was established by DOD Directive 4715.1, Environmental Security, and operates under DOD Instruction 4150.7, DOD Pest Management Program. The AFPMB recommends policy, provides guidance, and coordinates the exchange of information on all matters related to pest management throughout the DOD. This board has representation of each of the military departments and the DLA. As such, this permanently staffed organization is an important source of assistance related to the prevention of movement of invasive species, especially incidents involving quarantine, fumigation, dis-insectization, etc. Their web site is located at the following URL: <http://www.acq.osd.mil/afpmb/>. In the event that quarantine becomes necessary, additional guidance is provided in Air Force Instruction (AFI) 48-104/AR 40-12/Secretary of the Navy Instruction 6210.2A/, Quarantine Regulations of the Armed Forces.

CHAPTER 506

DOD PRE-CLEARANCE PROGRAM CUSTOMS AND AGRICULTURE INSPECTIONS

A. POLICY

1. The MCI program from OCONUS shore-based locations has been cancelled and is no longer recognized by the USCS. However, the USCS will support pre-clearance for major unit redeployments in conjunction with FTX or contingencies. This chapter outlines the policy and procedures to conduct those pre-clearance operations.
2. To effectively and efficiently conduct redeployment operations for exercises, contingencies, or other special airlift/sealift operations, theater Commanders may request USCS and USDA pre-clearance for redeployments of units, their equipment and sustaining supplies. Timelines for pre-clearance of redeployments should be established during the planning phase of the exercise or concurrently with the deployment phase during crisis action planning for a contingency. The theater Commander and the component commands involved in the redeployment must ensure that there are adequate facilities available for pre-clearance operations and work with the Services to identify military law enforcement personnel to be trained as CBCAs. Costs incurred by implementing provisions of this section (e.g., transportation, per diem, overtime charges) will normally be borne or furnished in kind by the requesting Service or Agency. If the supported command determines that pre-clearance of redeploying cargo and passengers will enhance mission effectiveness, the following request procedure must be followed.

B. PROCEDURES FOR REQUESTING PRE-CLEARANCE

1. The supported unit will submit requests for pre-clearance processing to the office of the appropriate theater command's Customs, Agriculture, and Border Clearance Staff Coordinator. Theater directives will prescribe procedures for processing such requests within the responsible unified command.
2. Requests must include, as a minimum:
 - a. The dates, times, and places of departure from foreign country.
 - b. Date, time, and proposed place of CTUS arrival.
 - c. The number and type of aircraft or ships.
 - d. The number of passengers, and amount and type of cargo, to include vehicles and other unit equipment.
 - e. Identification of all en route stops between the foreign departure point and the CTUS port of entry, and whether the border clearance integrity of the aircraft or ship will be maintained during those stops. If pre-clearance integrity cannot be maintained, pre-clearance authority is lost.
3. Requests should be electronically transmitted, to the appropriate theater command as part of the initial planning of the redeployment, but not later than 75 days prior to the execution. The theater Customs, Agriculture, and Border Clearance Staff Coordinator will forward the approved request to USTRANSCOM/J5-LT, Scott AFB, IL not less than 60 days prior to the first movement. USTRANSCOM/J5-LT will coordinate with the USCS for support.
4. The responsible unified command Customs, Agriculture, and Border Clearance Coordinator will review the requests. The review will include an assessment of the capability of the theater

command to accommodate the request for pre-clearance. In those instances where the unified command determines contingency or exercise pre-clearance can not be accommodated or is not cost effective, the unit will be required to return to the CTUS through a predetermined CTUS port of entry where US border clearance can be accomplished.

5. Approval of pre-clearance requests under the provisions of this section does not negate any requirements for the carrier to ensure that entry is accomplished at an established CTUS port of entry. This port of entry may be a Regular or Limited Foreign Clearance Base, an international commercial airport or seaport of entry, or any other airport or seaport where a FIS capability exists or can be arranged for on an exception basis. (Refer to DOD 4500.54-G, DOD Foreign Clearance Guide, North and South America, for United States of America aircraft entry requirements (<http://www.fcg.pentagon.mil>).)
6. If use of any CTUS port of entry other than those regularly staffed by FIS personnel is planned, the requesting organization or carrier operator is responsible for coordinating necessary requirements with the appropriate Customs Management Center or Port Directors office of the USCS, USDA, and other US border clearance agencies.

C. TRAINING AND CERTIFICATION OF CBCAS

1. The theater Commander and the Service component will coordinate the request to the appropriate Service for sourcing of military law enforcement personnel to act as CBCAs for the duration of the redeployment. Personnel should be E-4 and above.
2. Training will be provided and approved by USCS and USDA.
3. Training may be accomplished in the CONUS or at an overseas location, if necessary.
4. Upon successful completion of the training, USCS and USDA will provide certification for trainees.
5. Trained personnel will be appointed on orders as CBCAs by the sponsoring Service component command. Orders should include an effective termination date.
6. USCS and USDA will provide advisors to oversee actual pre-clearance operations.

D. RESPONSIBILITIES OF CBCAS

1. CBCAs are responsible for:
 - a. Performing their duties IAW this regulation and US and/or foreign country border clearance requirements.
 - b. Inspecting and certifying that DOD-owned materiel, personal property, and passengers are acceptable for entry into the US. If contraband is discovered during the inspection process, the CBCA is to notify proper legal authority.
 - c. Representing the commander in performance of inspections, and ensuring that the documentation for which they are responsible accompanies all shipments or personnel.
 - d. Ensuring that customs/border clearance violations are expeditiously reported to the appropriate legal authority or military agency for disposition.
 - e. Conducting all inspections and examinations in a professional, expeditious, and courteous manner.
 - f. CBCAs will not, under any circumstances, collect or accept duty payments.

E. PRE-CLEARANCE REQUIREMENTS

1. CBCAs, in conjunction with USCS/USDA personnel, will inspect all crews, troops, passengers, and their accompanied baggage, professional equipment, issued weapons, cargo and aircraft prior to departure from overseas bases (airfields/ports) when the planned destination is the CTUS. To expedite clearance upon redeployment to the CTUS:
 - a. Accompanied baggage and professional equipment excess to immediate personal needs will be inspected in the presence of the member by a CBCA /USCS team one or two days prior to unit redeployment. The baggage will then be secured and held in a sterile area from the time of the inspection until arrival at the US port of entry.
 - b. The CBCA/USCS team will inspect hand-carried baggage at the time passengers are processed into a sterile area for isolation until actual departure. If a sterile area is not available, the CBCA/USCS team will inspect the personnel and hand-carried baggage at the ocean or air terminal immediately prior to embarkation. If someone who has been inspected and is waiting in the sterile area finds it necessary to depart the area, that person must undergo a new inspection when they return to the sterile area.
 - c. The CBCA/USCS team will inspect unit equipment prior to its being loaded on the ship or aircraft to insure the equipment meets USCS and USDA border clearance requirements. The redeploying unit will ensure that personal property, such as footlockers, is readily identified and retains its individual integrity distinct from military cargo during shipment.
 - d. Personal customs declarations will be completed while en-route.
2. Immediately upon completion of the inspection/examination, DD Form 2855, U.S. Military Preclearance Program, Figure 506-1, will be properly executed, authenticated by official stamp and signature, and securely affixed to the outside of each container/vehicle/equipment inspected/examined. The CBCA or USCS/USDA inspector will accomplish the execution and attachment of the label. This form is to be used only for cargo that has been pre-inspected and certified by CBCA/USCS/USDA personnel at OCONUS locations as part of an exercise or contingency operation IAW Chapter 505 and 506 of this regulation and meets USCS and USDA CONUS pre-clearance entry requirements. DD Form 2855 can be found at <http://www.doir.whs.mil/forms/DD2855.PDF>.

U.S. MILITARY PRECLEARANCE PROGRAM	
AUTHORIZED USE ONLY IN ACCORDANCE WITH: DD FORM 2855, PART V, CHAPTERS 505 AND 506	
The U.S. Government property to which this label has been affixed meets the entry requirements of U.S. Customs and U.S. Agriculture	
1. INSPECTOR'S RANK AND NAME	2. DATE
3. ORIGIN	4. DESTINATION
5. INSPECTOR'S STAMP	

DD FORM 2855, JUN 2002

Figure 506-1. DD Form 2855, U.S. Military Preclearance Program

F. PRE-CLEARANCE COORDINATION AND COMMUNICATION

1. Coordination with, and notification of affected organizations of actual pre-cleared passengers, baggage and cargo shipments is critical to the successful implementation of the pre-clearance program for exercises, contingencies, or other special airlift/sealift operations. At a minimum, the following communications must occur after pre-clearance operations have been approved.
 - a. Upon approval and agreement of the USCS and USDA to support pre-clearance operations, the theater command customs and border clearance coordinator will notify affected organizations using the message format shown in Figure 506-2.
 - b. Airlift and sealift schedulers will keep the USCS and USDA notified of redeployment routing and schedules as soon as they are developed. USCS and USDA will notify regional and local port directors to notify of pre-cleared status of passengers, baggage, cargo, and/or conveyance to expedite Port of Embarkation (POE) procedures.

SAMPLE

```
FROM: (Theater Customs, Agriculture, and Border Clearance Coordinator)

TO: (Theater aerial ports)
    (Theater water ports)
    (Theater component customs and agriculture clearance offices and/or
    activities)

INFO: CDR MTMC ALEXANDRIA VA//MTOF//
      HQ AMC TACC SCOTT AFB IL//XOC/XOO/XOP//
      COMSC WASHINGTON DC//PM-5//
      USTRANSCOM SCOTT AFB IL//JMOCC/TCJ5-LT//
      DA WASHINGTON DC//DALO-TSP//
      HQ USAF WASHINGTON DC//ILGD//
      CMC WASHINGTON DC//LFT/LPO//
      CNO WASHINGTON DC//N41//

SUBJ: US CUSTOMS/AGRICULTURE PRECLEARANCE FOR (NAME OF EXERCISE OR OPERATION)

1. US CUSTOMS/AGRICULTURE PRECLEARANCE OPERATIONS HAVE BEEN COORDINATED AND
APPROVED FOR (NAME OF EXERCISE OR OPERATION) IAW DOD 4500.9-R, DEFENSE
TRANSPORTATION REGULATION, PART V.

2. POLICY AND PROCEDURES OUTLINED IN DOD 4500.9-R, PART V, CHAPTERS 505 AND 506
APPLY.

3. USCS ADVISORS WILL BE DEPLOYED TO (LOCATION) FROM (DATE) TO (DATE) TO
SUPERVISE PRE-CLEARANCE ACTIVITIES.

4. AERIAL AND WATER PORTS SHOULD SET UP STERILE AREAS TO STORE PRE-CLEARED
BAGGAGE AND CARGO PRIOR TO REDEPLOYMENT.

5. REQUEST AIRLIFT AND SEALIFT SCHEDULERS NOTIFY USCS AND USDA OF FLOW SCHEDULES
AND ROUTINGS TO AVOID UNNECESSARY RE-INSPECTIONS IN CONUS.

6. ADDITIONAL INSTRUCTIONS:

7. POC IS (NAME, ORGANIZATION, TELEPHONE NUMBER, DSN & COMMERCIAL).
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Figure 506-2. Sample Customs and Agriculture Pre-clearance Announcement Message

G. REQUESTS FOR CUSTOMS AND AGRICULTURE PRE-CLEARANCE

1. USCS and USDA, in cooperation with the DOD, will pre-clear cargo and passengers returning to the CTUS. This pre-clearance program is available for redeployments from major exercises or contingencies. Pre-cleared exercises will require little or no USCS or APHIS inspection into the US. Pre-clearance will lessen the contraband and pest risk and expedite the movement of personnel and equipment into the US. If the supported command determines that pre-clearance of redeploying cargo and passengers will enhance mission effectiveness, the following request procedure must be followed:
 - a. The supported unit will submit requests for USDA pre-clearance processing to USDA HQ, APHIS PPQ, Port Operations, 4700 River Rd., Riverdale, Md. 20737-5000, telephone number: 301 734-8295. For USCS, coordinate requests through HQ USTRANSCOM TCJ-5/LTC. Defense Switched Network (DSN): 312 779-1985, Commercial: 618 229-1985 for coordination. Theater directives will prescribe procedures for processing such requests within the responsible unified command (see paragraph G.3. for United States European Command (USEUCOM) requirements).
 - b. Requests must include, as a minimum: (1) the date, time, and place of overseas departure; (2) date/time of CTUS arrival; (3) the number and type of aircraft or ships; (4) the number of passengers and amount and type of cargo, to include vehicles and other unit equipment; (5) identification of all en route stops between the overseas departure point and the CTUS port of entry; and whether the border clearance integrity of the aircraft or ship will be maintained.
 - c. Requests should be electrically transmitted, to the appropriate theater command as part of the initial planning of the redeployment, but not later than 45 days prior to the execution. Theater commands will forward the approved request to APHIS HQ not less than 30 days prior to the first movement. Direct contact with APHIS HQ is authorized. USTRANSCOM/J5-LT will assist with coordination as needed.
 - d. Approval of pre-clearance requests under the provisions of this section does not negate any requirements for the carrier to ensure that entry is accomplished at an established CTUS port of entry. This port of entry may be a Regular or Limited Foreign Clearance Base, an international commercial airport or seaport of entry, or any other airport or seaport where a FIS capability exists or can be arranged for on an exception basis.
 - e. If use of any CTUS port of entry other than those regularly staffed by FIS personnel is planned, the requesting organization or carrier operator is responsible for coordinating necessary requirements with USCS and APHIS HQ.
2. Agreements must be in place to support USCS and APHIS advisors conducting pre-clearance duties in conjunction with returning personnel and equipment from contingencies and training exercises. The agreement will include provisions for overtime fees, car rental, transportation to/from site, per diem, and lodging entitlements.
3. USEUCOM Procedures. USEUCOM, with the cooperation of in-theater USDA representatives has established a pre-clearance program to enforce USDA requirements and have made agricultural pre-clearances mandatory. If exercise redeployments are originating in the USEUCOM AOR, the supporting unit should contact the EUCOM Customs/Agriculture Executive Agent (HQ USAREUR/ECJ1-CEA) directly to coordinate for pre-clearance assistance. Their web site URL is: <http://www.hqusareur.army.mil/opm/customs.htm>.

H. AGRICULTURE PRE-CLEARANCE PROCEDURES

1. Ships, aircraft, personnel, cargo (including ordinance) packing material, POVs, personal effects, and APO/FPO mail must be free of prohibited and restricted plants, animals, and plant and animal products when returned to the US.
2. Inspectors: USDA inspectors, or trained and certified CBCA or MCI-E inspectors will conduct these inspections.
3. Training: USDA will conduct training for DOD personnel. The DOD will be responsible for providing reimbursement for training in OCONUS sites. The USDA will fund routine training of MCI-E or other designees in the US.
4. Facilities: Inspections must be conducted in natural or well-lighted areas. Cleaning and disinfecting must be conducted in areas approved by USDA or designees. Commodities or equipment that have been approved for return to US must be stored in such a manner as to prevent re-infestation by pests or contaminants. USDA officers or designees must approve these areas.
5. Reporting: Numbers of inspection, cleaning and disinfecting should be reported, through the chain of command, to DUSD (ES) and APHIS. APHIS and DUSD (ES) must be informed of interceptions of significant pests. APHIS will assist in the identification of pests.
6. During exercises, unit moves, deployments, redeployments, or other special airlift/sealift operations, CBCAs, in conjunction with USCS/USDA personnel, will inspect all crews, troops, passengers, and their accompanied baggage, professional equipment, issued weapons, cargo and aircraft prior to departure from overseas bases (airfields/ports) when the planned destination is the CTUS. To expedite clearance upon redeployment to the CTUS:
 - a. Accompanied baggage and professional equipment excess to immediate personal needs will be inspected in the presence of the member by an CBCA/APHIS team one or two days prior to unit redeployment. The baggage will then be secured and held in a sterile area from the time of the inspection until arrival at the US port of entry.
 - b. The CBCA/APHIS team will inspect hand-carried baggage at the time passengers are processed into a sterile area for isolation until actual departure. If a sterile area is not available, the CBCA/APHIS team will inspect the personnel and hand-carried baggage at the ocean or air terminal immediately prior to embarkation. If someone who has been inspected and is waiting in the sterile area finds it necessary to depart the area, that person must undergo a new inspection when they return to the sterile area.
 - c. The CBCA/APHIS team will inspect unit equipment prior to its being loaded on the ship or aircraft to insure the equipment meets USCS and USDA border clearance requirements. The redeploying unit will ensure that personal property, such as a footlocker, is readily identified and retains its individual integrity distinct from military cargo during shipment.
 - d. DD Form 2855, Figure 506-1, is authorized to be used only for cargo that has been pre-inspected and certified by CBCA/USCS/USDA personnel at OCONUS locations as part of an exercise or contingency operation IAW Chapter 505 and 506 of this regulation and meets USCS and USDA CONUS pre-clearance entry requirements.
7. Some exercises may be pre-cleared for APHIS and not for US Customs. In these circumstances, US Customs clearance may be required upon arrival in the US. Personnel and equipment should not require additional APHIS inspection. APHIS always retains the right to do integrity checks in the US.
8. Any after action reports should include input from APHIS.

I. AIRBORNE TROOPS

Procedures described above are applicable to airborne troop movements with an airdrop upon return to the CTUS so long as the airdrops have been coordinated with USCS director in the district involved. The annotated customs declaration of these personnel must be provided to a member of the aircrew, preferably the aircraft commander, prior to the airdrop. The CBCA/USCS team will advise the aircrew member that the declarations must be turned over to USCS inspectors at the port of entry for the aircraft.